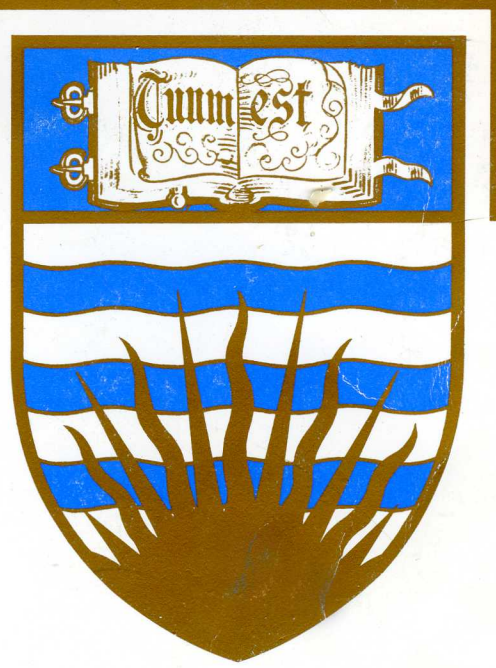

1986/87 CALENDAR

THE UNIVERSITY OF BRITISH COLUMBIA

The University of British Columbia

72nd Session

1986-87 Calendar

1986-87

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APPLICATION DATES FOR FACULTIES AND SCHOOLS FOR 1986-87

Dealines for new students, for students transferring from one faculty to another for the Winter Session and for students who were not accepted to a specific Faculty for the 1986-87 Winter Session as shown on the 1985-86 Statement of Marks issued by the Registrar's Office.

As application deadlines will be strictly enforced applicants are reminded to allow sufficient time for application forms to reach the University.

AGRICULTURAL SCIENCES	
B.Sc. (Agr.)	June 30
B.L.A.	April 30
APPLIED SCIENCE	
Engineering *(including transfers from other faculties and readmission)*	May 31*
Architecture	March 31
(for former UBC Architecture students not in attendance previous session)	June 15
Nursing *(four-year program)*	May 31*
Nursing *(Registered Nurses for admission to Third Year)*	February 1
Nursing students returning after interrupted studies	February 1
*(Documentation deadline June 30)	
ARTS	June 30
Family and Nutritional Sciences (B.H.E.)	June 30
Fine Arts B.F.A. Studio Program	March 31
Library, Archival and Information Studies (M.L.S. and M.A.S.)	March 1
Music (B.Mus.)	May 15
Social Work — B.S.W. (undergraduate program)	February 28
B.S.W. (for applicants with B.A. or equivalent degree)	January 31
COMMERCE AND BUSINESS ADMINISTRATION	May 31*
*(Documentation deadline June 30)	
DENTISTRY† *(including application for readmission)*	December 31
EDUCATION *(including transfers from other Faculties)*	May 31
Physical Education and Recreation (B.P.E.)	June 30
Diploma Programs *(early application advisable)*	April 1
FORESTRY	June 30
GRADUATE STUDIES *(enquire of department or school concerned in the event that other deadlines may apply.)*	June 30
LAW *(including application for readmission)*	December 31
MEDICINE† *(including application for readmission)*	January 15*
Audiology and Speech Sciences	March 31
Rehabilitation Medicine (Second Year) — B.Sc. (O.T.) and B.Sc. (P.T.) *(including application for readmission)*	February 28*
Medical Laboratory Science	April 30
*(Documentation deadline June 15)	
PHARMACEUTICAL SCIENCES *(including transfers from other Faculties)*	May 31*
*(Documentation deadline June 15)	
SCIENCE	June 30
NEW STUDENTS FROM OTHER COUNTRIES	April 30
READMISSION (Winter Session) — *Students returning to the University following an interruption of studies; students whose mark statements for the previous Winter Session did not indicate eligibility to return, and students wishing to change faculties must submit an Application for Readmission by this date. Applications for readmission received after this date will be processed as time permits but may result in late registration and its accompanying penalty.*	June 30 (unless earlier date indicated above)
Spring Session — out-of-province new students	April 1
Spring Session — in-province new students	April 15
Summer Session — out-of-province new students	April 15
Summer Session — in-province new students	May 15
Guided Independent Study	
— for courses starting in November	September 2
— for courses starting in January	November 3
— for courses starting in March	December 31
— for courses starting in May	March 2
— for courses starting in July	May 4
— for courses starting in September	June 30

† Students who are accepted to Medicine or Dentistry are required to submit a University Application Form (new students to UBC) or an Application for Readmission Form (former UBC students) not later than August 1.

Note: Where an application deadline falls on a day the University is closed, applications will be accepted on the following working day.

Some Important Telephone Numbers
Area Code 604

Admission Enquiries (Undergraduate Studies only)	*228-3014*
(Graduate Studies)	*228-6468*
Centre for Continuing Education	*222-2181*
Child Care Co-ordinator	*228-5343*
Conference Centre	*228-5441*
Counselling Centre	*228-3811*
Extra-Sessional Studies	*228-2657*
Faculty of Arts — (Senior Adviser)	*228-4028*
Faculty of Education (Teacher Education Office)	*228-5221*
Faculty of Law (Admissions)	*228-6303*
Faculty of Science — (Advisers)	*228-3820*
Financial Services Department	*228-2454*
Guided Independent Study	*224-8002*
Student Health Service	*228-7011*
Student Housing	*228-2811*
Language Institute (English as a second language)	*222-5285*
Reading, Writing and Study Skills Centre	*222-5245*
Registrar's Office (Registration and Records)	*228-2844*
Student Awards (Scholarships, Bursaries, Canada Student Loans)	*228-5111*
Student Counselling and Resources Centre	*228-3811*
Office for Women Students	*228-2415*
Main University Switchboard	*228-2211*

This publication is circulated to all universities, colleges and secondary schools in British Columbia; to all universities in Canada; to other universities on an exchange basis; to public libraries in British Columbia. Individual copies are provided without charge at the Office of the Registrar. However, there is a charge to cover the cost of postage and handling for mailing calendars.

Charges are as follows:

Canada	*$3.00*
U.S.A.	*$3.50*
Outside Canada (excluding U.S.A.)	*$7.00*

Separate calendars are not published for the Faculties and Schools.

1986-87

ACADEMIC YEAR 1986-87

September 1986

1 Monday — ACADEMIC YEAR 1986-87 begins.
Labour Day University closed.
Forestry Interior Field School, August 25–September 6 inclusive for Third Year (FRST 351).
Forestry Survey School. August 25–September 5 inclusive (FORH 263).
Mining and Mineral Process Engineering Field Trip for Fourth Year. (MMPE 499) August 30–September 13 inclusive.

2 Tuesday — Registration week begins Winter Session. Registration for Dentistry, Law, Medicine and Rehabilitation Medicine. Graduate Studies registration begins. Registration for other Faculties see September 3–5.
Classes begin: Medicine, Third year.
Agricultural Sciences Field Trip (AGSC 300). September 2–6 inclusive.
Forest Harvesting Field Trip (FORH 352). September 2–6 inclusive.
Residence rooms available because of late cancellations will be assigned from this day on to those on the waiting list who are present at the Housing Office to accept and pay for an assignment.
Guided Independent Study — course start date.

3 Wednesday — Registration September 3–5 for all students, except those in Dentistry, Law, Medicine and Rehabilitation Medicine (see September 2).
Evening (Extra-Sessional) courses — in person registration for courses not already filled. (Mail or in-person registrations accepted from approximately mid-July.)
Registrar's Office open September 3 and 4, 5.00 to 7.30 p.m. (Note: students new to the University must have already applied for admission to the University — see deadlines on previous page.)
Classes begin: Law, all years;
Medicine, First and Second Years;
Rehabilitation Medicine, all years.

4 Thursday — Classes begin: Dentistry, all years.

5 Friday — Last day of Registration Week, Winter Session. Late registration fee assessed after this date — all students.
Guided Independent Study — last day for in-person registration for courses starting in September.
AMS New Student Retreat (September 5, 6, 7).
Graduate Studies — last day for submission to most departments of Master's degree theses in final form for November graduation.

8 Monday — Winter Session day and evening courses, classes begin all faculties not already in session.

10 Wednesday — Meeting of the Senate.

14 Sunday — Last day Residence rooms will be held for assigned students unless notice of late arrival has been sent to the Housing Office.

16 Tuesday — Law — last day for course changes.

17 Wednesday — Last day for payment of first instalment of tuition fees. Students paying fees after this date will be assessed an additional fee.

19 Friday — Last day for changes in registration for First Term courses (beginning in September and ending in December).

26 Friday — Last day for completion of Bachelor's degree program requirements for graduation in November.
Last day for changes in registration for two-term courses (beginning in September and ending in April).

October 1986

1 Wednesday — General University Bursaries — last day for applications to be submitted to the Awards Office.
Faculty textbook adoptions required by Bookstore for courses beginning in January.
Graduate Studies — last day for major papers for non-thesis Master's degrees to be approved and submitted to departmental or faculty graduate offices for students wishing to graduate in November.

3 Friday — Registration subject to cancellation for non-payment of first instalment of tuition fees.

10 Friday — Last day for payment of second instalment of Residence fees. (Subject to change.)

13 Monday — Thanksgiving Day. University closed.

15 Wednesday — Graduate Studies — last day for submission to Library of Master's and Doctoral theses for graduation in November.
Graduate Studies last day for departments to notify Faculty of Graduate Studies that major papers have been submitted and all requirements met for non-thesis Master's degrees to be awarded in November.
Meeting of the Senate.

20 Monday — Homecoming, October 20–25.
Education — First term Practicum — most professional year programs (October 20–November 7).

22 Wednesday — Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in November.

November 1986

3 Monday — Guided Independent Study — course start date. Last day for in-person registration for courses starting in November.

11 Tuesday — Remembrance Day. University closed. Service in War Memorial Gymnasium for all students, faculty, alumni, staff and friends, 10:45 a.m.

12 Wednesday — Meeting of the Senate.

December 1986

5 Friday — Last day of classes for most faculties scheduling formal Christmas examinations.
Supplemental examinations Spring and Summer Sessions only.
Medicine — Second Year — last day of classes.

8 Monday — Christmas examinations begin most faculties, day and evening classes.
Medicine — Second Year — Christmas Examinations, December 8–12.

10 Wednesday — Meeting of the Senate.

12 Friday — Faculty textbook adoptions required by Bookstore for courses beginning in May.
Dentistry — last day of classes.

14 Sunday — Medicine — Fourth Year — last day of classes.

15 Monday — Dentistry — Christmas Examinations begin.

19 Friday — B.C. Student Assistance — last day for submission of applications for full assessment. After this date applicants will be eligible only for Federal Student Loans. (Deadline subject to change)
Medicine — First and Third Years — last day of classes.
Last day of Christmas Examinations, most faculties.
First term ends, Winter Session.

22 Monday — Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in January.

25 Thursday — Christmas Day. University closed.

26 Friday — Boxing Day. University closed.

January 1987

1 Thursday — New Year's Day. University closed.

5 Monday — Second term begins, Winter Session — all faculties, day and evening classes.
Medicine — First, Second and Third Years — classes begin.
Medicine — Fourth Year — Clinical Rotations begin.
Final instalment of tuition fees — students should mail fees to the Department of Financial Services.
Graduate Studies — students wishing to be considered for University Graduate Fellowships should contact the department concerned as soon as possible after January 5.
Guided Independent Study — course start date. Last day for in-person registration for courses starting in January.

1986-87

9	Friday	Final date for payment of third instalment of Residence fees. (Subject to change) Last day for registration for students registering in the second term. Late registration fee assessed after this date.
14	Wednesday	Law — last day for course changes, second term. Student Residence applications available at Housing Office. Last day for payment of final instalment of tuition fees for registered students continuing in the second term. Students paying after this day will be assessed an additional fee.
16	Friday	Last day for changes in registration for courses beginning in January.
21	Wednesday	Meeting of the Senate.
30	Friday	Registration subject to cancellation for non-payment of final instalment of tuition fees.

February 1987

2	Monday	Education Second Term Practicum — most professional year programs (February 2–27).
5	Thursday	Graduate Studies — last day for departments to submit applications for University Graduate Fellowships on behalf of students.
13	Friday	Deadline for submission of I. W. Killam Post Doctoral Fellowship applications. Faculty textbook adoptions required by Bookstore for courses beginning in July.
16	Monday	Deadline for Applications for Graduation to be submitted to the Registrar by all students expecting to graduate in May.
18	Wednesday	Meeting of the Senate. B.C. Student Assistance Program — last day for applications and appeals for 1986-87 Winter Session. (Subject to change.)
19	Thursday	Mid-term break most faculties, February 19 and 20. Lectures and laboratories cancelled. Library and other facilities open.
23	Monday	Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in March.
27	Friday	Dentistry and Medicine — First Year, end of Phase I.

March 1987

2	Monday	First day that Residence Applications are accepted. (Applications received by mail prior to this date will be dated March 2.) Dentistry and Medicine — First Year — examination week, (March 2–6). Guided Independent Study — course start date. Last day for in-person registration for courses starting in March.
5	Thursday	Graduate Studies — last day for submission of doctoral theses to the Faculty of Graduate Studies for Spring graduation. Graduate Studies — last day for departments to submit applications for Graduate Summer Fellowships on behalf of students.
9	Monday	Dentistry and Medicine — First Year, beginning of Phase II.
18	Wednesday	Meeting of the Senate.

April 1987

1	Wednesday	Faculty textbook adoptions required by Bookstore for courses beginning in September. Last day for submission to most departments of Master's degree theses in final form for Spring graduation.
2	Thursday	Faculty Association Annual Meeting, 1:00 p.m.
3	Friday	Last day of classes for most faculties. Dentistry — Third and Fourth Year — last day of classes.
6	Monday	Sessional examinations begin (day and evening classes), most faculties.
7	Tuesday	Last day for submission of graduating essays and theses, most Bachelor degree programs.
10	Friday	Graduate Studies — last day for major papers for non-thesis Master's degrees to be approved and submitted to departmental or faculty graduate offices for Spring graduation.
15	Wednesday	University Entrance Scholarships — last day for applications from Grade 12 students to be submitted to the Awards Office. Spring Session evening credit courses (May-July) last day for registration without late fee.
16	Thursday	Medicine — Third Year — last day of classes.
17	Friday	Good Friday. University closed.
20	Monday	Easter Monday. University closed.
21	Tuesday	Medicine — Third Year — sessional examinations begin, April 21–24.
22	Wednesday	Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in May. Dentistry — Second Year — last day of classes. Meeting of the Senate.
25	Saturday	Geography — Third Year students begin Field School (GEOG 309).
28	Tuesday	Civil Engineering Surveying Field Schools begin (CIVL 235 and 350) — students must register for these courses in Department of Civil Engineering between April 1 and 16. Dentistry — Third Year — examinations begin. Foresty — Third Year students begin 21-day Field Work at the University Research Forest, Maple Ridge, B.C. (FRST 451).
30	Thursday	Sessional Examinations end, most faculties. Second Term ends, Winter Session, most faculties. Accommodation in Residences for Winter Session ends. Those students in late finishing faculties may remain in Residence if they have registered and prepaid at the Housing Office but will be required to move to a "late-finishing" area. Graduate Studies — last day for submission to Library of Master's and Doctoral Theses for Spring graduation. Graduate Studies — last day for departments to notify the Faculty of Graduate Studies that major papers have been submitted and all requirements met for non-thesis Master's degrees for Spring graduation. Dentistry — Second Year — examinations begin.

May 1987

1	Friday	Education — Post Sessional Practicum — most professional year programs (May 1–15). Geological Sciences — Third Year students begin Field School in Fourth Year program (GEOL 335). Guided Independent Study — course start date. Last day for in-person registration for courses starting in May. Medicine — Second Year — last day of classes.
3	Sunday	Spring Session Residence rooms available for students with prepaid assignments.
4	Monday	Spring Session credit courses, first day of classes. Medicine — Second Year — examinations begin.
8	Friday	Dentistry — First Year — last day of classes. Medicine — First and Fourth Years — last day of classes. Spring Session — last day for payment of balance of tuition fees. Students paying after this date will be assessed an additional fee.
11	Monday	Dentistry and Medicine — First Year — examinations (May 11–15). Medicine — Fourth Year, 1987-88 session begins (May 11, 1987–May 20, 1988). (2-week inter-departmental course begins.)

1986-87

15	Friday	Affiliation Scholarships and Bursaries — last day for applications to be submitted to the Awards Office. General University Scholarships — last day for applications to be submitted to the Awards Office from students entering UBC from other post-secondary institutions, or returning to UBC. Medicine — First Year — last day of classes.
18	Monday	Victoria Day. University closed.
20	Wednesday	Meeting of the Senate.
25	Monday	Medicine — Fourth Year — 1986/87 Clerkship Rotations begin.
26	Tuesday	Baccalaureate Service, 8:00 p.m.
27	Wednesday	Annual Congregation for conferring of degrees, War Memorial Gymnasium.
28	Thursday	Annual Congregation for conferring of degrees, War Memorial Gymnasium.
29	Friday	Annual Congregation for conferring of degrees, War Memorial Gymnasium.

June 1987

1	Monday	Summer Session — last day for registration without late fee.
8	Monday	Spring/Summer Session — last day for B.C. Student Assistance Program applications for 1987. (Subject to change.)
19	Friday	Spring and Summer Sessions — last day for submission of applications for Scholarships and Bursaries.
22	Monday	Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in July.

July 1987

1	Wednesday	Canada Day. University closed.
2	Thursday	Last day for "early" submission of applications for B.C. STUDENT ASSISTANCE PROGRAM (B.C. and Canada Student Loans) for 1987-88 Winter Session. Students applying after this date may not receive funds by the commencement of the term. (Deadline subject to change.) Guided Independent Study — course start date. Last day for in-person registration for courses starting in July. Last day for submission of applications for supplemental examinations from previous Winter Session.
5	Sunday	Summer Session Residence rooms available for those with prepaid assignments.
6	Monday	Summer Session classes begin most courses.
10	Friday	Summer Session — last day for payment of balance of fees. Students paying after this date will be assessed an additional fee.
15	Wednesday	Graduate Studies — last day for Faculty of Graduate Studies to receive recommendations from departments for international students to be admitted in September.
24	Friday	Spring Session evening credit courses, lectures and examinations in all courses completed by this date. Supplemental examination period, (Winter Session) July 24–July 31.

August 1987

3	Monday	B.C. Day. University closed.
5	Wednesday	Medicine and Dentistry — supplemental examinations, August 5, 6, 7.
14	Friday	Summer Session classes end — most courses. Graduate Studies — last day for Faculty of Graduate Studies to receive files from departments on students accepted for registration in September.
15	Saturday	Summer Session examinations — most courses. Last day for Applications for Graduation to be submitted to the Registrar by all students expecting to graduate in November.
20	Thursday	Summer Session classes end for seven-week courses.
21	Friday	Summer Session examinations for seven-week courses.
24	Monday	Forestry Survey School, August 24–September 4 inclusive (FORH 263). Forestry Interior Field School, August 24–September 5 inclusive for Third Year (FRST 351). Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in September.
26	Wednesday	Graduate Studies — last day for submission of doctoral theses to the Faculty of Graduate Studies for November graduation.
31	Monday	ACADEMIC YEAR ENDS.

Note: Offices are closed Saturdays.

THE UNIVERSITY OF BRITISH COLUMBIA

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Commerce and Business Administration: A. DASZKOWSKI
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Education: T. A. KILLAM
Forestry: G. OLIVOTTO, B.A.
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Law: P. M. ARTHUR, B.A.
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(Terms expire 1987)

Elected by Convocation:
H. M. E. BELKIN, B.A.
G. D. BURNYEAT, LL.B.
P. M. FULTON, B.A., Dipl. Soc. Work.
G. C. P. GRAY, B.A.
A. E. MACDONALD, B.A.
H. J. MATHESON, B.A., M.A., Ed.D.
J. M. McCONVILLE, LL.B.
M. G. McMILLAN, LL.B.
M. L. PLANT, B.A., B.S.W.
M. SUGIMOTO, B.A., M.Ed.
N. E. WOO, B.A., M.Sc.
(Terms expire 1987)

Appointed by the Lieutenant-Governor in Council:
D. W. BARRON, B.Sc., M.I.C.E., M.I. Min.E., P.Eng. (Term expires 1987)
M. R. JONES, C.A. (Term expires 1987)
S. R. PEARCE, B.A. (Term expires 1987)

Representatives of affiliated colleges:
Vancouver School of Theology, Rev. A. VAN SETERS, B.A., B.D., Th.M., Th.D.
St. Mark's College, Rev. P. C. BURNS, C.S.B., S.T.B., Ph.D.
Regent College, C. E. ARMERDING, A.B., B.D., M.A., Ph.D.

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Dean of Science—R. C. MILLER, Jr., B.Sc. (Trinity College), M.Sc. (Penn. State), Ph.D. (Penn.).
Coordinator, Health Sciences—M. D. LOW, M.D., C.M., M.Sc. (Queen's), Ph.D. (Baylor), F.R.C.P.(C).
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J. K. STAGER, B.A. (McMaster), Ph.D. (Edinburgh).

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Registrar
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J. E. DE BRUIJN, B.A. (Victoria), B.L.S. (Brit. Col.), Assistant Librarian, Administrative Services.

A. JEFFREYS, B.Sc. (Wales), M.L.S., Ph.D. (Cal. L.A.), Assistant Librarian, Collections.

H. KEATE, B.Sc., B.L.S. (Brit. Col.), Assistant Librarian, Public Services (Branch Libraries).

R. W. MacDONALD, Assistant Librarian, Technical Processing.

W. J. WATSON, B.J. (Carleton), M.A., B.L.S. (McGill), Assistant Librarian, Public Services (Central Libraries).

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N. BALDWIN, B.A. (Calif. Lutheran College), M.L.S. (Calif.), Head.

Special Collections:
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L. DANIELLS, B.A., Dip. of S.W. (Man.), M.L.S. (Brit. Col.), University Archivist.

Wilson Recordings Collection:
D. KAYE, Head.

Woodward Library:
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EMERITUS STAFF

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The Honourable J. V. CLYNE, C.C., K.G.St.J., B.C. (1984)
DONOVAN F. MILLER, B.Com., S.M., (1978).
The Honourable NATHAN T. NEMETZ, (1975).
PHYLLIS G. ROSS, C.B.E. (1967).

Deans emeriti
HENRY F. ANGUS, S.M., Dean Emeritus of Graduate Studies (1956).
S. N. F. CHANT, O.B.E., Dean Emeritus of Arts and Science (1964).
I. McT. COWAN, O.C., Dean Emeritus of Graduate Studies (1975).
G. F. CURTIS, Q.C., Dean Emeritus of Law (1971).
B. A. EAGLES, Dean Emeritus of Agriculture (1967).
J. A. F. GARDNER, Dean Emeritus of Forestry (1985).
A. W. MATTHEWS, Dean Emeritus of Pharmacy (1967).
M. DOROTHY MAWDSLEY, Dean Emerita of Women (1959).
HELEN McCRAE, Dean Emerita of Women (1973).
V. J. OKULITCH, Dean Emeritus of Science (1971).
B. E. RIEDEL, Dean Emeritus of Pharmaceutical Sciences (1985).
G. M. VOLKOFF, M.B.E., Dean Emeritus of Science (1979).

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EDITH ALLEN, Assistant Registrar Emerita (1981).
J. E. A. PARNALL, Registrar Emeritus (1980).

Librarians emeriti
I. F. BELL, Associate Librarian Emeritus (1982).
M. DUTTON, Librarian Emerita (1985).
M. J. DWYER, Librarian Emerita (1985).
M. FUKUYAMA, Librarian Emerita (1985).
B. GIBSON, Librarian Emerita (1981).
J. C. F. GRAY, Librarian Emeritus (1978).
R. M. HAMILTON, Assistant Librarian Emeritus (1977).
W. HARRINGTON, Librarian Emeritus (1981).
S. JOHNSON, Librarian Emeritus (1985).
R. LANNING, Librarian Emeritus (1979).
M. LEIGHTON, Librarian Emerita (1985).
M. W. MacAREE, Librarian Emerita (1985).
E. MERCER, Assistant Librarian Emerita (1979).
D. SHIELDS, Librarian Emerita (1985).
A. M. SMITH, Assistant University Librarian Emerita (1965).

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D. F. ABERLE, Professor Emeritus of Anthropology and Sociology (1984).
L. ADAMOVICH, Professor Emeritus of Forestry (1984).
J. R. ADAMS, Professor Emeritus of Zoology (1980).
HARRY ADASKIN, Professor Emeritus of Music (1967).
G. P. V. AKRIGG, Professor Emeritus of English (1979).
J. GORDON ANDISON, Professor Emeritus of French (1962).
K. F. ARGUE, Professor Emeritus of Education (1972).
N. ARMSTRONG, Associate Professor Emerita of Education (1984).
L. F. ASHLEY, Associate Professor Emeritus of Education (1982).
H. BAKER, Clinical Associate Professor Emeritus of Paediatrics (1976).
J. A. BALFOUR, Clinical Professor Emeritus of Surgery (1978).
D. BANKSON, Professor Emeritus of Creative Writing (1985).
L. BARCLAY, Associate Professor Emeritus of Education (1976).
T. BATES, Associate Professor Emeritus of Mathematics and Science Education (1985).
K. BEAMISH, Professor Emerita of Botany (1977).
A. BEEDLE, Professor Emeritus of Commerce and Business Administration (1983).
C. T. BEER, Professor Emeritus of Biochemistry (1981).
H. R. BELL, Associate Professor Emeritus of Civil Engineering (1985).
J. C. BERRY, Professor Emeritus of Animal Science (1970).
F. E. BERTRAM, Associate Professor Emeritus of Language Education (1985).
R. V. BEST, Associate Professor Emeritus of Geological Sciences (1981).
D. BETHUNE-JOHNSON, Assistant Professor Emerita of Social and Educational Studies (1984).
W. F. BIE, Clinical Professor Emeritus of Obstetrics and Gynaecology (1982).
E. A. BIRD, Associate Professor Emeritus of French (1981).
A. GERALDINE BIRKETT, Professor Emerita of Education (1974).
J. E. BISMANIS, Professor Emeritus of Medical Microbiology (1977).
S. BLACK, Professor Emeritus of Education (1978).
H. H. BOUCHER, Clinical Assistant Professor Emeritus of Surgery (1976).
E. J. BOWMER, Clinical Professor Emeritus of Medical Microbiology (1980).
R. W. BOYD, Clinical Associate Professor Emeritus of Diagnostic Radiology (1976).
SADIE M. BOYLES, Professor Emerita of Education (1971).
W. J. BRACHER, Assistant Professor Emerita of Family and Nutritional Sciences (1985).
E. J. BRADLEY, Associate Professor Emerita of Health Care and Epidemiology (1977).
K. T. BREARLEY, Associate Professor Emerita of French (1980).
GRACE BREDIN, Associate Professor Emerita of Education (1968).
V. C. BRINK, Professor Emeritus of Plant Science (1978).
C. A. BROCKLEY, Professor Emeritus of Mechanical Engineering (1983).
ENOCH B. BROOME, Professor Emeritus of Education (1968).
M. BROWN, Assistant Professor Emerita of Language Education (1985).
CYRIL BRYNER, Professor Emeritus of Slavonic Studies (1973).
M. H. BULLOCK, Professor Emeritus of Creative Writing (1983).
B. E. BURKE, Associate Professor Emeritus of Commerce and Business Administration (1980).
J. H. CALAM, Professor Emeritus of Social and Educational Studies (1985).
J. J. R. CAMPBELL, Professor Emeritus of Microbiology (1983).
P. READ CAMPBELL, Associate Professor Emerita of Education (1972).
PAULINE CAPELLE, Associate Professor Emerita of Nursing (1971).
H. E. CAWSTON, Associate Professor Emerita of Nursing (1982).
FO-CHUAN CHANG, Professor Emeritus of Asian Studies (1973).
ESTELLE CHAVE, Assistant Professor Emerita of Social Work (1974).
D. H. CHITTY, Professor Emeritus of Zoology (1978).
R. M. CLARK, Professor Emeritus of Economics (1985).
W. H. COCKROFT, Clinical Associate Professor Emeritus of Medical Microbiology and Pathology (1976).
MABEL L. H. COLBECK, Associate Professor Emerita of English (1966).
A. C. COOKE, Professor Emeritus of History (1960).
H. G. COOPER, Clinical Assistant Professor Emeritus of Surgery (1979).
D. H. COPP, Professor Emeritus of Physiology (1981).
T. L. COULTHARD, Professor Emeritus of Agricultural Engineering and Mechanics (1975).
JEAN COULTHARD ADAMS, Senior Instructor Emerita of Music (1973).
H. M. COVELL, Professor Emeritus of Education (1978).
R. C. CRAGG, Professor Emeritus of the Fine Arts (1970).
A. O. J. CRICHTON, Professor Emerita of Health Care and Epidemiology (1985).
A. M. CROOKER, Professor Emeritus of Physics (1975).
L. G. R. CROUCH, Professor Emeritus of Mineral Engineering (1978).
J. DAHLIE, Professor Emeritus of Social and Educational Studies (1985).
DOROTHY DALLAS, Professor Emerita of French (1967).
C. G. DAVID, Professor Emerita of Educational Psychology and Special Education. (1985).

I. DAVIS, Associate Professor Emeritus of Commerce and Business Administration (1983).
J. de BRUYN, Associate Professor Emeritus of English (1983).
P. A. DEHNEL, Professor Emeritus of Zoology (1985).
ROBERT E. DELAVAULT, Associate Professor Emeritus of Geological Sciences (1973).
D. DERRY, Professor Emeritus of Mathematics (1974).
L. F. DETWILLER, Clinical Associate Professor Emeritus of Health Care and Epidemiology (1983).
C. E. DOLMAN, Professor Emeritus of Microbiology (1971).
J. P. DUNCAN, Professor Emeritus of Mechanical Engineering (1985).
B. A. DUNELL, Professor Emeritus of Chemistry (1985).
H. G. DUNN, Professor Emeritus of Paediatrics (1982).
G. H. DURRANT, Professor Emeritus of English (1981).
S. A. EGOFF, Professor Emerita of Librarianship (1983).
H. ELDER, Professor Emeritus of Architecture (1974).
A. J. ELLIOT, Professor Emeritus of Ophthalmology (1978).
G. B. ELLIOTT, Clinical Associate Professor Emeritus of Pathology (1985).
G. R. F. ELLIOTT, Professor Emeritus of Health Care and Epidemiology (1978).
JEAN FERGUSON, Assistant Professor Emerita of Education (1977).
D. B. FIELDS, Professor Emeritus of Commerce and Business Administration (1984).
H. D. FISHER, Professor Emeritus of Zoology (1985).
Z. FOLEJEWSKI, Professor Emeritus of Slavonic Studies (1976).
P. FORD, Associate Professor Emeritus of Zoology (1981).
J. S. FORSYTH, Professor Emeritus of Chemical Engineering (1982).
I. K. FOX, Professor Emeritus of Community and Regional Planning (1982).
G. H. FRANCIS, Clinical Associate Professor Emeritus of Surgery (1978).
S. M. FRIEDMAN, Professor Emeritus of Anatomy (1985).
M. FURSTENWALD, Associate Professor Emerita of Germanic Studies (1985).
F. E. GAMBLE, Professor Emeritus of Education (1983).
F. D. GARRETT, Professor Emeritus of Anatomy (1977).
E. GAUTSCHI, Senior Instructor Emeritus of Physical Education and Recreation (1984).
G. GAYMAN, Clinical Associate Professor Emeritus of Paediatrics (1980).
H. M. GEMEROY, Professor Emerita of Nursing (1977).
W. GERSON, Professor Emeritus of Architecture (1981).
D. C. GIBBARD, Professor Emeritus of Education (1978).
J. E. GIBBARD, Associate Professor Emeritus of Education (1966).
W. C. GIBSON, Professor Emeritus of History of Medicine and Science (1978).
M. GILROY, Associate Professor Emerita of Librarianship (1978).
F. A. GORNALL, Associate Professor Emeritus of Mathematics and Science Education (1983).
C. E. G. GOULD, Clinical Associate Professor Emeritus of Medicine (1976).
P. GOULDSTONE, Professor Emerita of Visual and Performing Arts in Education (1984).
C. C. GOURLAY, Professor Emeritus of Commerce and Business Administration (1982).
D. C. GRAHAM, Assistant Professor Emeritus of Medicine (1980).
K. GRAHAM, Professor Emeritus of Forestry (1977).
H. B. GRAVES, Clinical Associate Professor Emeritus of Anaesthesiology (1983).
R. F. GRAY, Professor Emeritus of Mathematics and Science Education (1985).
R. J. GREGG, Professor Emeritus of Linguistics (1978).
B. G. GRIFFITH, Professor Emeritus of Forestry (1967).
F. J. GROVER, Professor Emeritus of French (1985).
S. GRZYBOWSKI, Professor Emeritus of Medicine (1985).
A. M. GUNN, Professor Emeritus of Social and Educational Studies (1985).
P. G. HADDOCK, Professor Emeritus of Forestry (1978).
J. E. HALLIDAY, Professor Emeritus of Pharmaceutical Sciences (1977).
F. W. HANLEY, Clinical Associate Professor Emeritus of Psychiatry (1984).
F. C. HARDWICK, Professor Emeritus of Education (1972).
A. HARDYMENT, Clinical Professor Emeritus of Paediatrics (1980).
T. R. HARMON, Clinical Associate Professor Emeritus of Pathology (1979).
EMMA HARRIS, Associate Professor Emerita of Education (1971).
B. HARRISON, Professor Emeritus of History (1974).
W. J. HARTRICK, Professor Emeritus of Education (1984).
H. B. HAWTHORN, Professor Emeritus of Anthropology and Sociology (1976).
L. D. HAYWARD, Professor Emeritus of Chemistry (1984).
S. HEALY, Associate Professor Emeritus of Visual and Performing Arts (1985).
R. G. HERBERT, Professor Emeritus of Law (1985).
V. O. HERTZMAN, Clinical Professor Emeritus of Medicine (1985).
R. H. HEYWOOD, Professor Emeritus of Commerce and Business Administration (1975).
W. S. HOAR, Professor Emeritus of Zoology (1979).
W. L. HOLLAND, Professor Emeritus of Asian Studies (1973).
M. R. HOOD, Associate Professor Emerita of Rehabilitation Medicine (1979).
J. G. HOOLEY, Professor Emeritus of Chemistry (1981).
V. G. HOPWOOD, Associate Professor Emeritus of English (1984).
RUTH HUMPHREY, Associate Professor Emerita of English (1963).
F. W. B. HURLBURT, Clinical Professor Emeritus of Medicine (1982).
E. J. HYDE, Assistant Professor Emeritus of Preventive and Community Dentistry (1985).
S. M. JAMIESON, Professor Emeritus of Economics (1979).
A. M. JOHNSON, Clinical Professor Emeritus of Medicine (1982).
F. R. C. JOHNSTONE, Professor Emeritus of Surgery (1984).
D. P. JONES, Clinical Associate Professor Emeritus of Medicine (1985).
J. KATZ, Professor Emeritus of Education (1976).
R. B. KERR, Professor Emeritus of Medicine (1974).
L. R. KERSEY, Associate Professor Emeritus of Electrical Engineering (1980).
W. D. KITTS, Professor Emeritus of Animal Science (1984).
CARL KLINE, Clinical Associate Professor Emeritus of Psychiatry (1983).
F. MALCOLM KNAPP, Professor Emeritus of Forestry (1963).
F. KNOBLOCH, Professor Emeritus of Psychiatry (1982).
V. J. KRAJINA, Professor Emeritus of Botany (1982).
W. KRAYENHOFF, Associate Professor Emeritus of Mathematics and Science Education (1983).
A. B. LAITHWAITE, Associate Professor Emeritus of Physical Education and Recreation (1980).
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J. C. LAWRENCE, Assistant Professor Emeritus of History (1983).
P. O. LEHMANN, Clinical Instructor Emeritus of Surgery (1978).
E. LEIMANIS, Professor Emeritus of Mathematics (1974).
J. LEJA, Professor Emeritus of Mining and Mineral Process Engineering (1983).
S. W. LEUNG, Professor Emeritus of Oral Biology (1984).
CHI LI, Professor Emerita of Asian Studies (1970).
WEI-CHENG LIN, Professor Emeritus of Chemistry (1980).
S. L. LIPSON, Professor Emeritus of Civil Engineering (1980).
H. V. LIVERMORE, Professor Emeritus of Hispanic and Italian Studies (1981).
A. F. LIVESEY, Senior Instructor Emerita of English (1981).
R. R. LOFFMARK, Professor Emeritus of Commerce and Business Administration (1985).
H. S. MAAS, Professor Emeritus of Social Work (1984).
D. MACAREE, Associate Professor Emeritus of English (1985).
J. A. S. MacDONALD, Professor Emeritus of Visual and Performing Arts in Education (1985).
M. E. MacFARLANE, Associate Professor Emerita of Home Economics (1967).
D. C. G. MacKAY, Associate Professor Emeritus of Psychology (1970).
J. R. MacKAY, Professor Emeritus of Geography (1981).
V. A. MACKAY, Associate Professor Emerita of Education (1979).
HILDA M. MacKENZIE, Associate Professor Emerita of Education (1973).
E. MACSKASY, Associate Professor Emeritus of Mathematics (1984).
H. E. MALLORY, Professor Emerita of Nursing (1967).
K. C. MANN, Professor Emeritus of Physics (1981).
E. L. MARGETTS, Professor Emeritus of Psychiatry (1985).
W. H. MATHEWS, Professor Emeritus of Geological Sciences (1984).
A. S. McCONKEY, Clinical Assistant Professor Emeritus of Surgery (1979).
RUTH McCONNELL, Professor Emerita of Education (1981).
J. A. McDONALD, Associate Professor Emeritus of Spanish (1974).
T. B. McDONOUGH, Assistant Professor Emerita of Education (1981).
C. A. McDOWELL, University Professor Emeritus of Chemistry (1984).
J. McGECHAEN, Professor Emeritus of Education (1975).
M. F. McGREGOR, Professor Emeritus of Classics (1977).
H. W. McINTOSH, Professor Emeritus of Medicine (1985).
J. R. McINTOSH, Professor Emeritus of Education (1975).
A. D. McKENZIE, Clinical Professor Emeritus of Surgery (1983).
F. E. McNAIR, Clinical Assistant Professor Emeritus of Psychiatry (1984).
JOYCE A. McRAE, Assistant Professor Emerita of Education (1974).
K. C. McTAGGART, Professor Emeritus of Geological Sciences (1985).
J. D. McWHANNEL, Assistant Professor Emeritus of Education (1981).
L. MEDVECSKY, Senior Instructor Emeritus of Germanic Studies (1977).
C. W. MILLER, Associate Professor Emeritus of English (1980).
S. MILLER, Clinical Professor Emeritus of Anatomy (1982).
R. S. MILNE, Professor Emeritus of Political Science (1984).
A. M. MOORE, Professor Emeritus of Economics (1984).
EDMUND MORRISON, Professor Emeritus of English (1970).
F. A. MORRISON, Professor Emeritus of Pharmaceutical Sciences (1983).
B. B. MOSCOVICH, Clinical Associate Professor Emeritus of Medicine (1977).
B. N. MOYLS, Professor Emeritus of Mathematics (1984).
J. FRED MUIR, Professor Emeritus of Civil Engineering (1964).
D. C. MURDOCH, Professor Emeritus of Mathematics (1977).
F. E. MURRAY, Professor Emeritus of Chemical Engineering (1984).
J. E. MUSGROVE, Clinical Associate Professor Emeritus of Surgery (1982).
S. W. NASH, Professor Emeritus of Mathematics (1981).

J. W. NEILL, Professor Emeritus of Plant Science (1981).
M. B. NEVISON, Professor Emerita of Education (1982).
F. S. NEWBY, Assistant Professor Emeritus of English (1979).
R. L. NOBLE, Professor Emeritus of Physiology (1977).
R. A. NODWELL, Professor Emeritus of Physics (1984).
W. OPECHOWSKI, Professor Emeritus of Physics (1985).
MARGARET A. ORMSBY, Professor Emerita of History (1974).
R. F. OSBORNE, Professor Emeritus of Physical Education (1978).
E. G. OZARD, Professor Emeritus of Education (1974).
N. L. PADDOCK, Professor Emeritus of Chemistry (1983).
G. J. PARFITT, Professor Emeritus of Oral Medicine (1975).
A. V. PARMINTER, Assistant Professor Emeritus of Education (1982).
F. P. PATTERSON, Professor Emeritus of Surgery (1981).
J. E. L. PECK, Professor Emeritus of Computer Science (1984).
P. G. PENNER, Professor Emeritus of Education (1979).
MARIAN E. M. PENNEY, Professor Emerita of Physical Education (1973).
R. J. PHILLIPS, Senior Instructor Emeritus of Physical Education and Recreation (1980).
G. L. PICKARD, Professor Emeritus of Oceanography and Physics (1979).
A. E. PILOTO, Associate Professor Emeritus of English (1984).
P. PINKUS, Professor Emeritus of English (1984).
G. PITERNICK, Professor Emeritus of Librarianship (1983).
J. PITERS, Clinical Associate Professor Emeritus of Paediatrics (1976).
B. J . P. POLAND, Professor Emerita of Obstetrics and Gynaecology (1985).
W. J. POLGLASE, Professor Emeritus of Biochemistry (1982).
E. S. PRETIOUS, Professor Emeritus of Civil Engineering (1972).
M. A. PRIMEAU, Associate Professor Emerita of French (1979).
M. H. L. PRYCE, Professor Emeritus of Physics (1984).
H. M. C. PURKIS, Associate Professor Emerita of French (1984).
J. H. QUASTEL, Professor Emeritus of Psychiatry (Neurochemistry) (1982).
R. U. RATCLIFF, Professor Emeritus of Commerce (1972).
S. E. READ, Professor Emeritus of English (1966).
C. REID, Professor Emeritus of Chemistry (1984).
A. J. RENNEY, Professor Emeritus of Plant Science (1979).
C. S. RENNIE, Clinical Associate Professor Emeritus of Medicine (1982).
V. REVUTSKY, Associate Professor Emeritus of Slavonic Studies (1976).
J. I. RICHARDSON, Assistant Professor Emeritus of Religious Studies (1982).
W. O. RICHMOND, Professor Emeritus of Mechanical Engineering (1973).
D. L. RIZER, Associate Professor Emerita of Education (1975).
W. ROBBINS, Professor Emeritus of English (1975).
C. E. G. ROBINSON, Clinical Professor Emeritus of Medicine (1983).
H. S. ROBINSON, Clinical Professor Emeritus of Medicine (1984).
J. L. ROBINSON, Professor Emeritus of Geography (1984).
A. ROGATNICK, Professor Emeritus of Architecture (1985).
M. W. ROSE, Assistant Professor Emeritus of Visual and Performing Arts in Education (1984).
A. ROSENTHAL, Professor Emeritus of Chemistry (1979).
J. E. ROSS, Clinical Associate Professor Emeritus of Obstetrics and Gynaecology (1982).
C. A. ROWLES, Professor Emeritus of Soil Science (1980).
K. M. RUPPENTHAL, Professor Emeritus of Commerce and Business Administration (1983).
C. S. SAMIS, Professor Emeritus of Metallurgy (1977).
A. G. SAVERY, Senior Instructor Emerita of English (1983).
A. R. SAWYER, Professor Emeritus of Fine Arts (1984).
W. E. SCHWAHN, Associate Professor Emeritus of Education (1981).
W. R. F. SEAL, Associate Professor Emeritus of Education (1979).
S. SEGAL, Professor Emeritus of Paediatrics (1985).
B. SHUMAN, Clinical Associate Professor Emeritus of Paediatrics (1982).
N. R. SINCLAIR, Associate Professor Emerita of Education (1981).
H. C. SLADE, Professor Emeritus of Family Practice (1984).
L. H. SLIND, Professor Emeritus of Music Education (1975).
D. C. SMITH, Professor Emeritus of Education (1975).
G. A. SMITH, Professor Emeritus of Education (1983).
J. E. SMITH, Associate Professor Emeritus of Mathematics (1971).
R. N. SMITH, Professor Emeritus of Education (1979).
J. J. SOLECKI, Associate Professor Emeritus of Slavonic Studies (1984).
DOROTHY SOMERSET, Associate Professor Emerita of Theatre (1966).
D. E. SOULE, Professor Emeritus of Theatre (1984).
H. M. SOUTHARD, Assistant Professor Emerita of Rehabilitation Medicine (1983).
J. GORDON SPAULDING, Professor Emeritus of English (1973).
R. B. SPLANE, Professor Emeritus of Social Work (1982).
J. D. SPOUGE, Professor Emeritus of Oral Medicine (1985).
M. W. STEINBERG, Professor Emeritus of English (1983).
G. H. STEPHENSON, Clinical Associate Professor Emeritus of Psychiatry (1982).
J. J. STOCK, Professor Emeritus of Microbiology (1985).
R. STOKES, Professor Emeritus of Librarianship (1981).
M. M. STREET, Associate Professor Emerita of Nursing (1972).
G. T. STUBBS, Associate Professor Emeritus of Education (1981).
P. J. SYKES, Assistant Professor Emeritus of Physics (1984).
J. C. THOMAS, Clinical Professor Emeritus of Psychiatry (1976).
L. A. J. THOMAS, Associate Professor Emeritus of Fine Arts (1980).
MARY THOMPSON, Assistant Professor Emerita of Education (1973).
W. J. THOMPSON, Clinical Professor Emeritus of Surgery (1983).
W. M. THOMPSON, Professor Emeritus of English (1974).
C. WESLEY TOPPING, Professor Emeritus of Sociology (1954).
G. TOUGAS, Professor Emeritus of French (1984).
F. A. TURNBULL, Clinical Associate Professor Emeritus of Surgery (1976).
L. TYHURST, Associate Professor Emerita of Psychiatry (1983).
M. UPRICHARD, Professor Emerita of Nursing (1977).
F. B. VEY, Assistant Professor Emerita of Education (1976).
A. W. WAINMAN, Associate Professor Emeritus of Slavonic Studies (1978).
A. W. WALLACE, Clinical Associate Professor Emeritus of Health Care and Epidemiology (1977).
G. WALSH, Associate Professor Emeritus of Education (1979).
G. C. WALSH, Clinical Associate Professor Emeritus of Medicine (1982).
J. WALTERS, Professor Emeritus of Forestry (1985).
HARRY V. WARREN, Professor Emeritus of Geological Sciences (1973).
J. B. WARREN, Professor Emeritus of Physics (1980).
DOROTHY WASHINGTON, Assistant Professor Emerita of Education (1971).
E. L. WATSON, Professor Emeritus of Bio-Resource Engineering (1979).
D. J. WATTERSON, Clinical Professor Emeritus of Psychiatry (1982).
E. M. WEISGARBER, Professor Emeritus of Music (1985).
D. M. WHITELAW, Professor Emeritus of Medicine (1978).
J. W. WHITELAW, Clinical Professor Emeritus of Paediatrics (1982).
R. L. WHITMAN, Clinical Associate Professor Emeritus of Psychiatry (1985).
H. D. WHITTLE, Professor Emeritus of Physical Education and Recreation (1982).
D. H. WILLIAMS, Professor Emeritus of Medicine (1974).
L. R. WILLIAMS, Clinical Assistant Professor Emeritus of Surgery (1978).
R. WILSON, Clinical Professor Emeritus of Paediatrics (1976).
B. P. WISNICKI, Professor Emeritus of Architecture (1978).
C. C. WISNICKI, Assistant Professor Emerita of Architecture (1984).
L. G. WOOD, Clinical Instructor Emeritus of Surgery (1978).
G. WOODCOCK, Lecturer Emeritus (1977).
L. I. WOOLF, Professor Emeritus of Psychiatry (1984).
D. J. WORT, Professor Emeritus of Botany (1975).
J. T. YOUNG, Professor Emeritus of Education (1976).
M. D. YOUNG, Professor Emeritus of Paediatrics (1978).
YAO-NAN YU, Professor Emeritus of Electrical Engineering (1975).
N. C. ZACHARIAS, Senior Instructor Emeritus of Pharmaceutical Sciences (1980).
S. H. ZBARSKY, Professor Emeritus of Biochemistry (1985).
L. R. ZELDOWICZ, Clinical Assistant Professor Emeritus of Medicine (1976).

GENERAL INFORMATION

THE ESTABLISHMENT AND CONSTITUTION OF THE UNIVERSITY

The creation of a university in British Columbia was first advocated in 1877. In 1890 an act of the Provincial Legislature established "The University of British Columbia" but the venture failed for a lack of a quorum at the first meeting of the Senate. In 1908 the earlier act was repealed and a new act established incorporating the University. The University operated under this act and its amendments as the sole public university in the Province until 1963 at which time a new Universities Act was passed by the Legislature making provision for sister institutions.

The University opened in the autumn of 1915 in temporary quarters on part of the site of the General Hospital in Fairview. At the beginning of the Session 1925-26 the University commenced work on its permanent campus in Point Grey.

The Universities Act was rewritten in 1974 and has since been further revised. The University currently operates under the authority of the University Act of the Province of British Columbia (R.S.B.C. 1979, c419). Following are excerpts from the Act.

". . . the following . . . universities in the Province

(a) "The University of British Columbia";

(b) "University of Victoria";

(c) "Simon Fraser University".

"Each University shall be composed of a chancellor, a convocation, a board, a senate, and faculties. Each university shall have in its own right and name the power to grant degrees established in accordance with the provisions of this Act."

"The convocation of each university shall be composed of: the chancellor, who shall be chairman; the president; the members of the senate; all faculty members; all persons who are graduates of the university; and all persons whose names are added to the roll of the convocation by regulation of the senate . . ."

"The board shall be composed of fifteen members as follows: (a) the chancellor; (b) the president; (c) two faculty members elected by the faculty members; (d) eight persons appointed by the Lieutenant-Governor in Council, two of whom shall be appointed from among persons nominated by the Alumni Association; (e) two students elected by and from the Student Association; (f) one person elected by and from the full-time employees of the university who are not faculty members."

"The senate of each university shall be composed of: (a) the chancellor; (b) the president, who shall be chairman; (c) the academic vice-president or equivalent; (d) the deans of faculties; (e) the chief librarian; (f) the director of continuing education; (g) a number of faculty members equal to twice the number provided in clauses (a) to (f), to consist of two members of each faculty elected by the members of that faculty, and the remainder elected by all the faculty members in such manner as they, in joint meeting, determine; (h) a number of students, equal to the number provided in clauses (a) to (f), elected by and from the Student Association in a manner that ensures that at least one student from each faculty is elected; (i) four persons who are not faculty members, elected by and from the convocation; (j) four persons appointed by the Lieutenant-Governor in Council; (k) one member to be elected by the governing body of each affiliated college of the university; and (l) such additional members as the senate may from time to time determine without altering the ratio set out in clauses (g) and (h)."

"Each university shall, so far as and to the full extent which its resources from time to time permit . . . (a) establish and maintain colleges, schools, institutes, faculties, departments, chairs, and courses of instruction; (b) provide instruction in all branches of knowledge; (c) establish facilities for the pursuit of original research in all branches of knowledge; (d) establish fellowships, scholarships, exhibitions, bursaries, prizes, rewards, and pecuniary and other aids to facilitate or encourage proficiency in the subjects taught in the university and original research in all branches of knowledge; (e) provide a program of continuing education in all academic and cultural fields throughout the Province; and (f) generally promote and carry on the work of a university in all its branches, through the co-operative effort of the board, senate, and other constituent parts of the university."

"Each university shall be non-sectarian and non-political in principle."

Coat-of-Arms of the University

Argent three Bars wavy Azure issuant from the base of a demi Sun in splendour proper on a Chief of the second an open Book also proper edged strapped and buckled or inscribed with the words "TUUM EST".

COURSES OF STUDY AND DEGREES

The University offers instruction in each of twelve faculties and nine schools. Graduate work is offered by the Faculty of Graduate Studies which, also includes the School of Community and Regional Planning, the Institutes of Animal Resource Ecology, Applied Mathematics, Asian Research, Industrial Relations, International Relations, the Centre for Studies in 19th Century Music, Coal Research Centre, Centre for Human Settlements, Centre for Metallurgical Process Engineering, Centre for Transportation Studies, and the Westwater Research Centre.

The Degrees offered are as follows:

Agricultural Sciences:	Bachelor of Science in Agriculture (B.Sc. (Agr.)) Bachelor of Landscape Architecture (B.L.A.) Master of Science (M.Sc.) Master of Applied Science (M.A.Sc.) Doctor of Philosophy (Ph.D.)
Applied Science (Engineering):	Bachelor of Applied Science (B.A.Sc.) Master of Applied Science (M.A.Sc.) Master of Engineering (M.Eng.) Master of Science (M.Sc.) Doctor of Philosophy (Ph.D.)
Architecture:	Bachelor of Architecture (B.Arch.) Master of Advanced Studies in Architecture (M.A.S.A.)
Arts:	Bachelor of Arts (B.A.) Bachelor of Music (B.Mus.) Bachelor of Fine Arts (B.F.A.) Master of Music (M.Mus.) Master of Arts (M.A.) Master of Fine Arts (M.F.A.) Doctor of Philosophy (Ph.D.) Doctor of Musical Arts (D.M.A.)
Audiology and Speech Sciences:	Master of Science (M.Sc.) Doctor of Philosophy (Ph.D.)
Commerce and Business Administration:	Bachelor of Commerce (B.Com.) Master of Business Administration (M.B.A.) Master of Science in Business Administration (M.Sc. (Bus. Admin.)) Doctor of Philosophy (Ph.D.)
Community and Regional Planning:	Master of Arts (M.A.) Master of Science (M.Sc.) Doctor of Philosophy (Ph.D.)
Dentistry:	Doctor of Dental Medicine (D.M.D.) Master of Science (M.Sc.)
Education:	Bachelor of Education (Elementary) (B.Ed.) Bachelor of Education (Secondary) (B.Ed.) Bachelor of Education (Special Education) (B.Ed.) Master of Education (M.Ed.) Master of Arts in Education (M.A.) Doctor of Education (Ed.D.) Doctor of Philosophy (Ph.D.)
Family and Nutritional Sciences:	Bachelor of Home Economics (B.H.E.) Master of Arts (M.A.) Master of Science (M.Sc.) Doctor of Philosophy (Ph.D.)
Forestry:	Bachelor of Science in Forestry (B.S.F.) and B.Sc. (Forestry) Master of Forestry (M.F.) Master of Science (M.Sc.) Master of Applied Science (M.A.Sc.) Doctor of Philosophy (Ph.D.)
Law:	Bachelor of Laws (LL.B.) Master of Laws (LL.M.)
Library, Archival and Information Studies:	Master of Library Science (M.L.S.) Master of Archival Studies (M.A.S.)
Medicine:	Bachelor of Medical Laboratory Science (B.M.L.Sc.) Doctor of Medicine (M.D.) Master of Health Science (M.H.Sc.) Master of Science (M.Sc.) Doctor of Philosophy (Ph.D.)
Nursing:	Bachelor of Science in Nursing (B.S.N.) Master of Science in Nursing (M.S.N.)
Pharmaceutical Sciences:	Bachelor of Science in Pharmacy (B.Sc. (Pharm.)) Master of Science (M.Sc.) Doctor of Philosophy (Ph.D.)
Physical Education and Recreation:	Bachelor of Physical Education (B.P.E.) Bachelor of Recreation Education (B.R.E.) Master of Physical Education (M.P.E.)

Rehabilitation Medicine:	Bachelor of Science in Occupational Therapy (B.Sc. (O.T.)) Bachelor of Science in Physical Therapy (B.Sc. (P.T.))
Science:	Bachelor of Science (B.Sc.) Master of Science (M.Sc.) Doctor of Philosophy (Ph.D.)
Social Work:	Bachelor of Social Work (B.S.W.) Master of Social Work (M.S.W.)

Diplomas offered are as follows:
Administration for Engineers
Administration for Foresters
Applied Linguistics
Art History
Education
Film/Television Studies
Periodontics
Translation (French)

Certificate offered:
Site Planning

Honorary Degrees

The degrees of Doctor of Laws (Honoris Causa), Doctor of Science (Honoris Causa) and Doctor of Letters (Honoris Causa), LL.D., D.Sc., and D.Litt., respectively, are the honorary degrees conferred from time to time by the Senate of the University upon persons who have achieved distinction in scholarship or public service.

Academic Dress

The undergraduate's gown is black in colour and of the ordinary stuff material, of ankle length, and with long sleeves and the yoke edged with khaki cord. The Master's gown is the same, without cord. The Ph.D. regalia consists of a gown, Cambridge style, of maroon silk material with front facing panel and sleeves of UBC blue with gold piping; hood, Cambridge pattern, blue silk outside and gold lining; cap, decanal bonnet, of maroon silk with gold cord and tassel. The Ed.D. regalia consists of a gown similar in style to that of the Ph.D. but of black stuff; hood American style with lining of light blue and with chevron of University blue, white and gold; cap, decanal bonnet of black stuff with gold cord and tassel. The D.M.A. regalia is similar to that of Ed.D. with hood lined with alizarin crimson and a chevron of University blue and gold.

The colours for the various degrees are:

B.A.	University blue
B.F.A.	University blue with magenta cord
B.A.Sc.	scarlet
B.Com.	light grey with black and grey cord
B.Ed.	white with cord of University blue
B.H.E.	turquoise
B.L.A.	maize with scarlet cord
M.L.S.	cadmium yellow
M.A.S.	University blue with silver and cadmium yellow twisted cord
B.Mus.	University blue with cord of alizarin crimson
B.Sc.	light blue
B.Arch.	scarlet with white cord
D.M.D.	lilac and red
Ed.D.	royal blue and light blue, with blue, white and gold chevron
B.P.E.	malachite green
B.R.E.	malachite green with gold and green cord
B.Sc. (Agr.)	maize
B.S.F.	brown with green cord
B.Sc. (Forestry)	brown with a blue cord
B.S.N.	scarlet with twisted cord of University blue and white
B.Sc. (Pharm.)	dark green with cord of scarlet
B.Sc. (O.T.)	scarlet and white twisted cord on royal blue
B.Sc. (P.T.)	scarlet and white twisted cord on royal blue
B.S.W.	magenta
LL.B.	amethyst violet
M.D.	scarlet and royal blue
B.M.L.Sc.	scarlet and royal blue twisted cord on white
M.H.Sc.	scarlet and grey
Ph.D.	blue and gold
D.M.A.	royal blue and alizarin crimson, with blue and gold chevron

The Master's hood is the same as the Bachelor's, lined with the distinctive colour. The M.B.A. hood conforms similarly to that of the B.Com. The M.Sc. (Bus. Admin.) hood is similar to that of M.Sc. with grey trim and black and white cord. The M.Eng. hood is the same as that of the M.A.Sc. except that it is trimmed with a University blue cord. The hood for the honorary degree of LL.D. is of scarlet broadcloth lined with dark blue velvet, that for the D.Sc. is the same with dark purple lining; and for the D.Litt., the same with cream lining.

SESSIONS

Academic Year

The *Academic Year* begins on the first day of September and ends on the last day of August.

Winter Session

The Winter Session is divided into two terms — the first term generally from early September to late December, although some studies begin in August — the second term, from early January to, generally, the end of April but some studies continue well into the month of May.

During the Winter Session classes are offered in the evening as well as in the day.

Enrolment is possible beginning in January to certain courses offered completely in the second term, subject to space being available.

Spring Session

The *Spring Session* begins in early May or late April and continues to June or July depending upon the demands of the particular courses being offered. The courses are in general given during the evening.

Summer Session

The *Summer Session* begins at the end of June or in early July and consists of six weeks of study for most courses, while some courses continue for an additional week.

Guided Independent Study *(Correspondence Courses)*

Courses are offered in a limited number of disciplines by correspondence. Registration for most correspondence courses is at six specified intake periods during the year.

Cancellation of Classes

The University of British Columbia accepts no responsibility for the cancellation or discontinuance of any class or course of instruction which may be made necessary or desirable as a result of an act of God, fire, riot, lock-out, stoppage of work or slow-down, labour disturbances, lack of funds, the operation of law or other causes of the kind.

ADMISSION TO THE UNIVERSITY

Admission requirements as indicated in this section refer to the minimum educational level necessary for admission to the University from other institutions in Canada and elsewhere. Reference must also be made to those sections of the calendar giving specific requirements of the various study programs in the several Faculties and Schools.

General Reservation on Admissions:

The University reserves the right, the published regulations notwithstanding, to reject applicants for admission on the basis of their overall academic records even if they technically meet entrance requirements and to limit enrolment if its facilities and resources are inadequate by selecting from among qualified applicants those who will be admitted.

The record of each applicant will be analyzed for its relevance to the University program for which application is made. Admission will be granted only if this relevance is clear. An applicant must be able to undertake studies in the medium of the English language and produce evidence of competence so to do; where there is doubt an applicant may be required to take a test of facility in the English language prior to acceptance to University studies and, if admitted, contract at the student's expense to do remedial studies if this is considered necessary.

An applicant admitted to the University may be given credit, where appropriate, for subjects previously taken at a college or another university, subsequent to the applicant's graduation from secondary school, but such **advance credit** will be tentative only and will be subject to review after one or more sessions have been completed by the student in attendance at the University. Advance credit is not given for subjects taken by an applicant prior to the applicant's graduation from secondary school. However, advanced placement may be given where appropriate. These provisions apply to appropriate subjects with high academic achievement on the Advanced Level (G.C.E.), Principal Level (H.S.C.) or Higher Level (I.B.).

Except in special circumstances no student under the age of sixteen is admitted.

Physically Disabled

Academically able students who have some physical disability should not be discouraged from considering attendance at university. Some university study pro-

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grams have certain physical requirements but the majority do not. Students should not assume that physical disabilities will preclude their acceptance but rather seek advice from faculty advisers concerning the implications of their disabilities. An applicant who feels that advice concerning registration in a certain study program is overly pessimistic and discouraging may ask for a thorough investigation of the question by the Senate Admissions Committee.

Students with physical disabilities who are admitted to the university should enquire of the Student Counselling and Resources Centre (228-3811) regarding services available which include several forms of special assistance.

Appeals:

Applications are screened carefully in accordance with Senate policy. The Senate Admissions Committee reviews doubtful cases and cases of appeal against decisions made on the basis of Senate policy.

A. British Columbia/Yukon Secondary School Applicants

The minimum academic qualification for admission to the University is Senior Secondary School Graduation. A minimum C+ average is required, with borderline applicants being considered on an assessment of their capacity for success in university studies as determined by the Senate Admissions Committee.

The C+ average will be calculated on the following courses:

1. English 11
2. English 12
3. Social Studies 11
4. Algebra 11
5. French 11 or another approved language 11*
6. a Science 11

7-8-9. three courses, numbered "12" from the following list**.

*A beginner's language 11 does not fulfil this requirement.

**B.Mus. applicants may substitute a Grade 12 music course.

Algebra 12	Geometry 12
Biology 12	German 12
Chemistry 12	History 12
English Literature 12	Latin 12
French 12	Physics 12
French 12A	Probability & Statistics 12
Geography 12	Spanish 12
Geology 12	Western Civilization 12

The requirements listed above must include all prescribed subjects for the University study program being sought. Prescribed and recommended subjects follow under the heading "Specific Program Requirements".

NOTE 1. Applicants who because of administrative difficulties in their schools cannot present the courses as required, may be excused the specific deficiency on petition (for reasonable cause) by the principal of the school concerned. In these cases other courses will be substituted in the calculation of standing.

NOTE 2. Any applicant who, in June, has any deficiencies due to failures or who does not meet the minimum C+ average standing will not be considered for admission in that same year on the basis of summer school grades or supplemental examinations.

NOTE 3. The course requirements indicated above apply to students entering First Year directly from secondary school. Applicants to any level above First Year, who present at least a full year of university-level studies as advance credit, will be considered for admission, in general, on their university-level studies.

No student will be admitted with incomplete or conditional standing.

The University reserves the right to require additional study time of those admitted whose previous studies are inappropriate to the program to be taken at University.

SPECIFIC PROGRAM REQUIREMENTS

Program of Studies in:	Secondary School graduation must include:	In addition if possible:
Agricultural Sciences	Algebra 12 Two of: Biology 11, Chemistry 11, Physics 11 One of: Biology 12, Chemistry 12, Geology 12, Geometry 12, Physics 12	(preferably all three)
Applied Science (Engineering) A professional four-year program (may also be entered following First Year Science)	Chemistry 11, 12 Algebra 11, 12 Physics 11, 12	Geometry 12 Enriched Algebra 12
Architecture A professional program first requiring completion of a degree. See requirements for Applied Science, Arts or Science.		
Archival Studies A professional program first requiring completion of a Bachelor's degree. See requirements for Arts or other undergraduate programs.		
Arts		
For Physical Geography and Honours Psychology	Algebra 11	Albegra 12
For Ecomonics	Algebra 12	
For Speech Sc. Major (Linguistics)	Algebra 12	
Languages other than English required for B.A. degree: (i) French 12 or another language "12", or (ii) French 11 or another language "11" plus one University year in same language, or (iii) Two University years in a language.		
Audiology & Speech Sciences A graduate program first requiring completion of a B.A. degree in Speech Sciences. See Arts requirements (under Linguistics).	Algebra 12	Physics 12
Commerce and Business Administration A professional program first requiring completion of undergraduate preparatory year (see Commerce Section).	Algebra 11	Algebra 12
Dentistry A professional program first requiring completion of a minimum of three years in Science (see Science requirements) or Arts.	Chemistry 11 Algebra 11 Physics 11	Biology 11, 12 Chemistry 12 Algebra 12
Education In general students should anticipate their teaching majors/concentrations. Special requirements for the following B.Ed. (Sec.) programs should be noted:		
Agriculture concentration	Chemistry 11 Algebra 12	Biology 11 Physics 11
Biology major/concentration	Chemistry 11 Algebra 12 Physics 11	Biology 11 Chemistry 12
Chemistry major/concentration	Chemistry 11 Algebra 12 Physics 11	Chemistry 12
Commerce	Algebra 11	Algebra 12
French major/concentration	French 11	French 12
Home Economics major/concentration	Algebra 11	Chemistry 11 Algebra 12 Physics 11 Foods 11 & 12 Textiles 11 & 12
Industrial Education major		Chemistry 11 Algebra 11 Physics 11
Mathematics major/concentration	Algebra 12 Physics 11	Physics 12
Physics major/concentration	Chemistry 11 Algebra 12 Physics 11	Physics 12

Family and Nutritional Sciences		
Family Sciences major General Home Economics Program major	Chemistry 11 Algebra 11	Biology 11 Algebra 12 Physics 11 Foods 11, 12A, 12B Textiles 11 & 12
Human Nutrition major Dietetics major Honours Nutrition	Chemistry 11 Algebra 12 Physics 11	Biology 11 Chemistry 12 Foods 11, 12A, 12B
Forestry A four-year professional program. Admission directly from secondary school or following First Year Science, requiring three years for completion (see Science requirements)	Algebra 12 Two of: Biology 11 Chemistry 11 Physics 11 Two of: Biology 12 Chemistry 12 Physics 12	All three recommended
Landscape Architecture	Algebra 12 Biology 11 Chemistry 11 or Physics 11 A Social Science 12, preferably Geography 12. A Science 12, preferably Biology 12	
Law A professional program first requiring completion of a minimum of three years (45 units) in an approved undergraduate program. See requirements for Arts, Commerce, etc.		
Library Science A professional program first requiring completion of a Bachelor's degree. See requirements for Arts or other undergraduate programs.		
Medical Laboratory Science A professional program requiring a diploma in Medical Laboratory Technology, Registered Technologist General Diploma, and Chemistry 205 and 230 or equivalent (or Chemistry 230 and 3 units of Arts electives).	Consult B.C.I.T. Calendar or other institution offering M.L.T. program	
Medicine A professional program first requiring completion of a minimum of three years in Arts or Science (or the equivalent thereof).	See requirements for Faculty of Arts or Science	
Music (as for Arts) For B.Mus. degree a Music 12 may be substituted for one of the required 12 level subjects.		
Nursing	Biology 12 Chemistry 12 Algebra 11 Physics 11	
Pharmaceutical Sciences A professional program first requiring completion of one year in Science (see Science requirments) or Arts.	Chemistry 11 Algebra 12 Physics 11	Biology 11, 12 Chemistry 12 Physics 12
Physical Education	Algebra 11	Algebra 12 Biology 11, 12 Chemistry 11 Physics 11
Rehabilitation Medicine Professional programs in physical therapy **or** occupational therapy normally entered following completion of one year at university or college.	Chemistry 11 Algebra 11 Physics 11	Biology 11 Chemistry 12 Algebra 12
Science	Chemistry 11 Algebra 12 Physics 11 one more Science 12	Other courses chosen from: Biology 11, 12 Computer Science 11 Chemistry 12 Earth Science 11 Geology 12 Geometry 12 Physics 12 Probability and Statistics 12
Social Work A professional program first requiring completion of two years in the Faculty of Arts	Algebra 11	

B. Applicants for Transfer from a College or University in British Columbia.

The University will accept students on transfer from public colleges on the same basis as students transferring from a provincial university. A student who chooses courses at a public college that are appropriate to an academic objective at the University and who obtains adequate standing in them will be accepted for further studies at the University under the same conditions that apply to a student who has taken all post-secondary studies at the University. A student with an unsatisfactory record at a college or another university will not be accepted for transfer.

Transfer policy:

1. *General Admission Requirements*—The basic principle is that transfer be considered only for those students whose previous academic records are satisfactory. The minimum standing considered as satisfactory is a C average or gradepoint average of 2.0 (calculated on a 4-point scale: A = 4, B = 3, C = 2, D = 1, F = 0) on *all* college or university courses attempted, including failures and repeated courses. Certain schools and faculties require a higher grade point average for admission. Where experience with former college students indicates that a higher grade point average should be required for certain University programs, the Senate Admission Committee will determine the appropriate standing to be required. B.C. Regional College students should refer to the College-University Transfer Guide for assitance in planning their college programs.
2. *Unassigned Credit*—May be granted for university transfer courses where a course-to-course equivalent cannot be established. This credit may be used as elective credit. Elective credit may be either in a particular discipline, e.g. "Economics (1½) units," or in a Faculty, e.g. "Arts (3) units." *Students should be cautioned that specific requirements exist at the Faculty level and in most Department programs. These cannot normally be fulfilled by elective credit.*
3. *Minimum Passing Grades*—Students transferring from any college or university may be granted transfer credit for courses in which the minimum passing grade has been obtained, subject to the approval of the faculty/school concerned.
4. *Maximum Credit Granted*—Course transfer will be recognized for all appropriate courses taken at colleges or universities, although the amount of credit granted is limited to a maximum depending upon the particular study program elected. In general transfer credit is limited to the initial two years of a degree program, but credit at a more senior level is possible if prior permission has been obtained from the Faculty concerned.
5. *Letter of Permission*—A student once enrolled and eligible to continue studies, who plans on obtaining a UBC degree, may obtain transfer credit from another institution only if prior permission has been obtained from the Faculty in which the student is enrolled.
6. *Course Descriptions*—Students applying for admission on transfer to this University from another University or College may be required to supply a current copy of the Calendar of the University at which they have previously studied in order that an evaluation of their records can be made.
7. *Challenge credit*—Courses that have been successfully "challenged" at other institutions will be useful to provide advance placement at the University, but credit for such "courses" will not be given toward a degree. The University of British Columbia will grant credit on transfer only where the course concerned is recognized by the University as suitable for transfer credit and is taken in the normal way by the student.
8. *Appealing for Additional Credit*—Students who feel an error has been made in the credit granted on transfer should first make a written request to the Registrar for a review of credit granted on transfer and if they are still in doubt should consult the Dean of the Faculty to which they are seeking admission.
9. *Institutes of Technology and Colleges of Applied Arts and Technology:* Consideration will be given to applicants from institutes of technology and colleges of applied arts and technology provided they have acceptable standing. Such applicants will be considered for admission and possible advanced standing on an individual basis. Advanced credit for up to one full year of degree study may be granted where appropriate.

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C. Secondary School Applicants from other Canadian Provinces
(Minimum Educational Level Required)

Applicants will be considered for admission to The University of British Columbia who have followed an academic program leading to University Entrance. Students will be required to present English to the Senior Year level and all prescribed subjects for the university studies sought. (See Specific Program Requirements.)

Completion of secondary school graduation is mandatory, and a minimum average of 'C+' or equivalent is required. Whether secondary school graduation represents 12 or 13 years of schooling the minimum study for a university degree is four years. **The following requirements apply:**

Ontario — Secondary School Honours Graduation Diploma (Grade 13) or Ontario Secondary School Diploma with six Ontario academic courses including English. Note: Advance credit will not be granted for secondary school courses.

Quebec — At least one year of an academic diploma program of a CEGEP with an overall average of 75%. Advanced credit for up to one full year of degree study may be granted where the two-year diploma has been awarded.

Alberta, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, P.E.I., Newfoundland, and Northwest Territories — Grade 12 graduation with standing in at least five academic Grade 12 subjects including English.

NOTE: Early admission is possible for students with strong academic standing enrolled in the final year of secondary school. Applicants must arrange for their schools to provide official transcripts including first-term or mid-term grades and a listing of courses in progress. Offers of early admission are subject to satisfactory completion of secondary school graduation.

D. Applicants Transferring from Post-Secondary Institutions in Canada

B.C. Regional Colleges: The minimum standing required is a "C" average or gradepoint average of 2.0 (calculated on a 4-point scale: A=4, B=3, C=2, D=1, F=0) on all university transfer courses attempted including failures and repeated courses. Certain Schools and Faculties require a higher gradepoint average for admission. Where experience with former college students indicates that a higher gradepoint average should be required for certain University programs, the Senate Admissions Committee will determine the appropriate standing to be required. Please refer to the College-University Transfer Guide in conjunction with the University Calendar, for assistance in planning your college program.

Institutes of Technology and Colleges of Applied Arts and Technology: Consideration will be given to applicants from institutes of technology and colleges of applied arts and technology provided they have acceptable standing. Such applicants will be considered for admission and possible advanced standing on an individual basis.

Universities and other Colleges: A student must present an entirely satisfactory academic record with an overall average of at least 60% or the equivalent. Certain Schools and Faculties require a higher average for admission.

NOTE: A student who is on academic probation at another post-secondary institution is not eligible for admission to The University of British Columbia.

E. International Applicants

The University of British Columbia is interested in considering applications for admission from outstanding students from countries outside Canada. Students are NOT encouraged to travel to Canada in anticipation of admittance to this University, either directly or following studies in a Canadian secondary or other post-secondary institution. International students admitted on a Student Authorization to other universities, community colleges, or secondary schools in Canada or the United States must normally obtain the baccalaureate degree before obtaining permission to transfer to this University.

Minimum standing for admission in terms of some educational credentials:

General Certificate of Education (G.C.E.) — standing in at least five different subjects with two at the Advanced Level. Normally, a minimum grade of "C" is required of all subjects attempted. The subjects must include English, plus Mathematics or another language and prerequisites appropriate for the intended program of study.

School Certificate (S.C.) — A Division 1 Certificate with standing in at least five different subjects with two at the Principal Level on the Higher School Certificate (H.S.C.) A minimum numeric grade of "3" or the equivalent is required on all subjects attempted. Normally a minimum grade of "C" is required on all subjects attempted. The subjects must include English, Mathematics or another language and prerequisites appropriate for the intended program of study.

International Baccalaureate (I.B.) — Satisfactory standing in at least six subjects appropriate to the student's intended program of study, three at the subsidiary level and three at the higher level, with a Diploma awarded on 27 or more points.

Certificate of Matriculation — Applicants who have matriculated at a recognized university may be admitted provided subject prerequisites and academic standing are met for admission to U.B.C.

High School Graduation in the United States of America — High school graduation on an academic program with a cumulative gradepoint average of at least 3.0 and rank in the top one-fifth of the graduating class. The high school subjects must be appropriate to the student's intended program of study and should include four years of English and at least three years of Mathematics.

NOTE 1. Because of the differences in world educational systems, satisfactory completion of secondary school is not necessarily an acceptable basis for admission to first year. The University of British Columbia reserves the right to determine whether or not a student is eligible for admission and to determine what advanced credit, if any, may be granted.

NOTE 2: Applicants presenting appropriate subjects with high academic achievement on the Advanced Level (G.C.E.), Principal Level (H.S.C.) or Higher Level (I.B.) may, where appropriate, be considered for advanced placement (without credit). The Office of the Registrar automatically considers all applicants for advanced placement.

NOTE 3: English Proficiency: A student whose native language is not English must demonstrate proficiency in the English language by obtaining a score of at least 550 on the Test of English as a Foreign Language.

NOTE 4: Applicants should realize that almost NO financial assistance is available at the undergraduate level, and that Immigration regulations prohibit international students from being gainfully employed while in Canada.

Additional information for students from other countries

(i) Applicants may be required to take a test in their own country to demonstrate adequate facility with the English language. On arrival at UBC those who are found to be inadequately prepared will be required to take remedial studies. Preparatory English courses are five or ten hours of instruction per week for twelve weeks. Fees are $355 for FELT 020 or FELT 030 (five hours a week) and $710 for FELT 010 (ten hours a week). Textbooks and other learning material would be an additional cost.

(ii) A student must enrol for the course to which admitted. Transfer to another program will not be considered until the student has completed at least one session in the course for which initially admitted to this University.

F. Applicants for admission to the Faculty of Graduate Studies.

The minimum requirement for admission to the Faculty of Graduate Studies is graduation from a recognized university or four-year college with at least a bachelor's degree in an honours program or the equivalent. The standing required is at least an "upper second class".

G. Senior Citizens

B.C. residents aged 65 years or over, who are eligible for admission to the University may enrol in credit courses without payment of tuition fees. This does not apply, however, to areas where only a limited number of students may be accommodated, such as Medicine, Dentistry, Law, Nursing, or any faculty or department where existing facilities and resources are inadequate.

H. Applicants seeking admission as Mature Students

A student classified as "mature" is one who is a Resident of B.C. whose formal education has been interrupted and who lacks formal university matriculation but whose interests and activities have led to continued intellectual development to an extent that would permit acceptance of the student to the University. The University reserves the right to determine whether or not a student can be classified as "mature"; the determination will not be made on the sole criterion of chronological age.

An applicant who applies for admission as a mature student and is not granted admission in this category, will be advised of an alternate route of study, usually at a college, in order to prepare for future admission as a regular student.

Each applicant is considered on an individual basis. Application must be made to the Registrar, giving the applicant's school and employment background. It may be necessary for the applicant to be interviewed by the Dean of the Faculty concerned and to take aptitude tests administered by the Student Counselling and Resources Centre.

A mature student is permitted to undertake degree or diploma studies on the same basis as a fully-matriculated student.

I. English Compositon Requirement

To qualify for an undergraduate degree all students (except those studying for the B.Arch. degree) must satisfy the English Composition requirement. To do this, students must obtain credit for English 100 or Arts One (or the equivalent) and must pass the English Composition Test (ECT).

Students (including transfer students) who have obtained credit for English 100 but who have not passed the ECT will write it in late September. The Test will also be given during the December examination period, in late March or April, and in July. Students who anticipate difficulty passing the Test are advised to enrol in a remedial English course through the Centre for Continuing Education.

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Students taking the ECT must attach to the examination booklet either a "Fee Waived" sticker (given to those taking the exam for the first time), or a "Fee Paid" sticker which must be purchased in advance from the Department of Financial Services for a fee of $10.00. Students enrolled in English 100 will, if eligible, receive a "Fee Waived" sticker from their instructors.

J. English Placement Test

All students entering The University of British Columbia who have not already successfully completed the equivalent of the required First Year University English 100 are required to write the English Placement Test. As soon as students have received their Authorization to Register form, they should write their student number on one copy of their English Placement Test score and mail it to the Office of the Registrar, 204-2075 Wesbrook Mall, The University of British Columbia, Vancouver, B.C. V6T 1Z2.

When students from the Province of British Columbia register at the University in September, they must bring with them an official copy of the English Placement Test score, and present it when registering in English 100.

Students in the Province of British Columbia have the opportunity to write the Test in March, July and November.

A special sitting of the English Placement Test will be held at U.B.C. prior to Registration. This sitting is for students from outside B.C. only.

Further information about the fee for the English Placement Test and sitting times may be obtained from the Educational Research Institute of B.C., Suite 305, 601 West Broadway, Vancouver, B.C., V5Z 4C2. Tel: 873-3801, or the Department of English at UBC 228-4247 after May 1, 1986.

ADMISSION PROCEDURE

Enquiries concerning admission should be made to the:
Office of the Registrar,
204-2075 Wesbrook Mall,
The University of British Columbia, Vancouver, B.C., Canada,
V6T 1Z2.
Tel. 604-228-3014

Application Dates for the various Faculties and Schools are shown at the beginning of this calendar. All necessary educational documents and an Application for Admission form must be submitted by the designated date. Late applications may be considered on an individual basis for those study programs where there is no limit on enrolment and where time permits.

Notification of Acceptance is made to applicants after application has been made and all necessary documents have been reviewed. Information concerning registration procedure will be provided to all successful applicants with an Authorization to Register.

Documents submitted in support of applications become the property of the University and may not be returned to the student.

WARNING

If all relevant documents have not been received by the Office of the Registrar at least six weeks prior to the beginning of the session applied for it is unlikely the application for admission can be processed in time to permit registration.

STUDENT DECLARATION AND RESPONSIBILITY

Each student is required to furnish the information necessary for the University record, to keep the Registrar's Office informed of changes in name, address, etc., and to sign the following declaration:

"I hereby accept and submit myself to the statutes, rules and regulations, and ordinances of The University of British Columbia, and of the faculty or faculties in which I am registered, and to any amendments thereto which may be made while I am a student of the University, and I promise to observe the same."

The University authorities do not assume responsibilities which naturally rest with adults. This being so, it is the policy of the University to rely on the good sense and on the home training of students for the preservation of good moral standards and for appropriate modes of behaviour and dress.

CLASSIFICATION OF STUDENTS

In terms of academic studies being followed there are four categories of students: (i) regular, (ii) qualifying, (iii) unclassified, (iv) auditor.

(i) **Regular:** a student enrolled for studies leading to a degree or a diploma whether on a full-time or a part-time basis.

(ii) **Qualifying:** a student enrolled in make-up studies in preparation for registration as a regular student in a graduate or professional program. Qualifying status is granted only to those students who are recommended by the Departments concerned for such status.

(iii) **Unclassified:** a student enrolled for studies not intended to lead to a particular degree or diploma.

(iv) **Auditor**

An auditor is defined as a student registered in a credit course whose participation is limited to that deemed appropriate by the instructor but who, in general, is expected to maintain the same schedule of readings as regular students although not expected to write examinations.

An auditor may not transfer to the category of regular student during the term nor may a regular student transfer to the category of auditor except upon the recommendation of the Dean of the Faculty concerned.

Application for admission as an auditor must parallel the procedures for the application of regular students. The application for admission must be accompanied by a written explanation of the reason that status as an auditor is sought. Where an applicant has not met formal requirements for admission to the University, or to the course involved, a full statement of previous relevant activities must be submitted with the application in order that consideration can be given for special admission in the category "mature."

Once formal application has been made the decision on acceptance or otherwise will be made by the Dean of the Faculty concerned or his delegate.

The fees for auditors will be the same as those for regular students.

There will be a statement of "audit" on the permanent academic record for any course taken by a student as an auditor. Students taking a combination of credit and audit courses will be subject to restrictions on maximum work load imposed by the Faculties as interpreted by Faculty advisers.

GENERAL ACADEMIC REGULATIONS

ACADEMIC FREEDOM

The members of the University enjoy certain rights and privileges essential to the fulfilment of its primary functions: instruction and the pursuit of knowledge. Central among these rights is the freedom, within the law, to pursue what seem to them fruitful avenues of inquiry, to teach and to learn unhindered by external or non-academic constraints, to engage in full and unrestricted consideration of any opinion. This freedom extends not only to the regular members of the University but to all who are invited to participate in its forum. Suppression of this freedom, whether by institutions of the state, the officers of the University or the actions of private individuals, would prevent the University carrying out its primary functions. All members of the University must recognize this fundamental principle and must share responsibility for supporting, safeguarding and preserving this central freedom. Behaviour which obstructs free and full discussion, not only of ideas which are safe and accepted but of those which may be unpopular or even abhorrent, vitally threatens the integrity of the University's forum. Such behaviour cannot be tolerated.

APPEAL PROCEDURE

Students who wish to protest decisions relating to their academic studies may do so. The protest should be made initially as near the source of difficulty as possible, presumably an instructor, and progress to the Head of the Department concerned and then to the Dean of the Faculty. There is a standing committee of the University Senate, the Committee on Appeals on Academic Standing, that reviews all appeals made to the Senate which is the senior academic authority in the University. A student who wishes to appeal to the Senate a decision of a Faculty, shall lodge a written notice of appeal with the Secretary of Senate, Office of the Registrar, within 10 days of being informed in writing of the Faculty's Final decision. Within five days of receiving a notice of appeal, the Secretary of Senate shall send to the appellant a copy of the Senate appeal regulations.

ATTENDANCE

Except where specifically stated otherwise in the regulations of a particular faculty or school a student may not receive a degree without completing the equivalent of two winter sessions in attendance at the University, one of which should be the final year.

Regular attendance is expected of students in all their classes (including lectures, laboratories, tutorials, seminars, etc.). Students who neglect their academic work and assignments may be excluded from the final examinations. Students who are unavoidably absent because of illness or disability should report to their instructors on return to classes.

Students, who because of illness are absent from a December or April examination, must submit a certificate, obtained from a doctor, to the Student Health Service as promptly as possible.

Students may not, concurrently with their University attendance, take studies for University degree credit through any other institution by correspondence, evening or regular session class without the approval of the Dean of the Faculty in which they are studying at the University.

The University reserves the right to limit attendance, and to limit the registration in, or to cancel or revise, any of the courses listed. Information concerning limitations on attendance for the various faculties and schools is found in the sections of this calendar devoted to those faculties and schools.

DEGREE OR PROGRAM REQUIREMENTS

Degree or program requirements are established and modified with the knowledge and approval of Senate and are recorded in the Calendar under the appropriate

listing. Unless a student takes an extraordinary number of years to complete prescribed studies, the student is usually given the option of meeting requirements in effect when first enrolled or of meeting revised requirements subsequently approved by Senate.

Interpretation of the requirements will be provided in normal cases by the Dean of the Faculty concerned and where differences occur by the Registrar.

CHANGE OF REGISTRATION

A student desiring to make a change in the program of courses in which registered must apply initially to the Office of the Dean of the Faculty in which registered and subsequently report the changes to the Registrar's office in writing. Except in special circumstances, a one-term course may be added to or dropped from a student's program only within the first two weeks after the beginning of the course, and a two-term course within the first three weeks.

A student must be registered in all courses being taken for credit, and may not drop courses without permission of the Dean of the Faculty. A student who ceases to attend a course, does not write the final examination, or otherwise fails to complete course requirements, and who neither qualifies for a deferred examination (see DEFERRED EXAMINATIONS below) nor has obtained official permission to drop the course, will be given a grade of "F" in the course and will be deemed to have failed it. No supplemental examination can be granted under these circumstances.

A student is responsible for the completeness and accuracy of registration as it relates to the regulations of the degree or diploma program in which the student is enrolled.

EXAMINATIONS

Formal examinations are held in most courses in April and in many courses in December. Other tests are held at the discretion of the instructors and Faculties concerned. All prescribed examinations are mandatory. A student who misses a terminal examination either in December or April because of illness or domestic affliction should apply to the Dean of the Faculty within two days after the close of the examination period for special consideration.

In any course which involves laboratory work, a student must complete the laboratory assignments with satisfactory standing before being admitted to the written examination of the course. A student may be required by the Faculty to discontinue such a course during any term because of failure to maintain a satisfactory standing in laboratory work, or because of absence from an appreciable number of laboratory periods through illness or other causes.

Rules governing formal examinations

1. Each candidate must be prepared to produce, upon request, a Library/AMS card for identification.
2. Candidates are not permitted to ask questions of the invigilators, except in cases of supposed errors or ambiguities in examination-questions.
3. No candidate shall be permitted to enter the examination room after the expiration of one-half hour from the scheduled starting time, or to leave during the first half hour of the examination.
4. Candidates guilty of any of the following, or similar, dishonest practices shall be immediately dismissed from the examination and shall be liable to disciplinary action.
   (a) Making use of any books, papers or memoranda, calculators, audio or video cassette players or other memory aid devices, other than those authorized by the examiners.
   (b) Speaking or communicating with other candidates.
   (c) Purposely exposing written papers to the view of other candidates. The plea of accident or forgetfulness shall not be received.
5. Candidates must not destroy or mutilate any examination material; must hand in all examination papers; and must not take any examination material from the examination room without permission of the invigilator.
6. A final examination becomes the property of the University and must remain in the possession of the University until destroyed or otherwise disposed of. No later than one month from receipt of end of session results a student may make written application to the Department Head, Director or Dean, who will make every effort to arrange for the student to view her or his marked final examination paper(s) with the course instructor or designate. The purpose of this exercise is purely pedagogic and distinct from the "review of assigned standing".

GRADING PRACTICES

In most Faculties individual courses and, where appropriate, entire sessional programs, are graded as follows: Class 1, 80% or over; Class 2, 65% to 79%; Pass, 50% to 64%; Fail, below 50%. Some Faculties also apply this grading procedure to standing upon graduation.

The Faculties of Dentistry, Medicine and Graduate Studies and the Schools of Library and Archival Studies, Nursing, and Rehabilitation Medicine, define Pass as 60-64% and Fail as below 60%.

A few programs of study make provision for an "honours standing", and where this is done it is explained in the calendar material of the particular Faculty. However, in most Faculties where "honours" is used it is applied to a study program where expectations in terms of achievement and level of study are higher than in other programs.

A student having been successful in studies but unable to write a final examination because of illness or domestic affliction may be granted "Aegrotat" standing. This standing gives full credit for the course concerned.

PROMOTION REGULATIONS

Promotion practices vary among Faculties and are described in the Faculty sections of this calendar.

General regulations applicable to all Faculties are:

(i) except in special cases, no student may repeat a course, other than English 100 or Mathematics 100, more than once;

(ii) a student in any session will be assigned **Fail** standing for the session where a study program of more than 6 units has been taken with satisfactory standing in less than 60% of it or where a study program of 6 or fewer units has been taken with satisfactory standing in less than 50% of it;

(iii) a student in any session who is assigned Fail standing will normally be required to discontinue study at the University for at least one year;

(iv) a student in the first or second year of University following Grade 12 will not be permitted to re-enrol to repeat that level of work; should that level of studies subsequently be repeated successfully elsewhere, consideration would be given to the student's readmission to the University.

(v) a student at any level of University study who fails for a second time, whether in repeating a year or in a later year, will be required to withdraw from the University; after a period of at least one year an appeal for permission to re-enrol will be considered. Such an appeal will be granted only after the appeal has been reviewed by the Dean of the Faculty concerned and approved by the Senate Admissions Committee.

EXAMINATION RESULTS

Results of the sessional examinations in April are mailed to students in the graduating classes about the time of Convocation, and to students in the lower years by approximately June 15. Any student who must meet an application date for another institution prior to June 15 should inform the transcript clerk in the Registrar's Office in order that arrangements may be made to meet the deadline.

Results of examinations in other sessions and in Guided Independent Study courses are mailed to students as soon as possible after they become available.

DEFERRED EXAMINATIONS

Faculties grant deferred examinations under special circumstances, particularly in cases where a student has missed an examination through illness. Students who are unable to write the final examinations in December or April through circumstances beyond their control should notify the office of the Dean of their Faculty at the earliest possible time in order that consideration might be given to the possibility of granting a deferred examination. In the case of illness or injury a medical certificate must also be submitted to the Student Health Service. Deferred examinations are written at the same time as supplemental examinations and the deferred examination, in most cases, is the same as the supplemental examination for a particular course.

SUPPLEMENTAL EXAMINATIONS

Supplemental examinations regulations vary among Faculties and are described in the Faculty/School sections of this Calendar. Students are governed by the regulations of the Faculty or School in which they are registered.

Supplemental examinations are not available in all Faculties or in all courses. In courses in which proficiency is judged on a continuing basis throughout a term, or in which final examinations are not given, or in Arts and Commerce courses where the final examination contributes less than 40% of the course grade, no supplemental examinations are provided.

Supplemental examinations are not granted to students registered in a graduate program. A course in which a grade of less than 65% was obtained may be repeated for a higher standing if recommended by the Department and approved by the Dean of Graduate Studies.

Where a supplemental examination is provided a student may write it in an attempt to obtain "higher standing" in the course concerned. The result of the supplemental examination will be shown on the student's record as an additional entry. In some situations a higher mark may enhance a student's chance of meeting some specific program requirement.

In a guided independent study course a supplemental will normally be granted if the student obtains a final standing of not less than 40%.

In the spring or summer session or extra session a student who obtains credit in a 3-unit course will be granted a supplemental examination in a second subject if the final mark is not less than 40% in the second subject.

In all but the Final Year a candidate who has been granted a supplemental may write it once only. If the candidate fails, the course must be repeated or a permissible substitute taken. Normally in the Final Year a second supplemental examination may be written.

Supplemental examinations will be held late July early August. Applications must be made to the Office of the Registrar on or before July 2, and must be accompanied by the required fee.

Supplemental examinations may be written at the following centres:

Cranbrook, Dawson Creek, Kamloops, Kitimat, Penticton, Powell River, Prince George, Prince Rupert, Trail, Victoria; and at Whitehorse, Y.T. Other centres outside of British Columbia are restricted to universities or colleges.

In unusual circumstances a student working in a remote area may be permitted to write supplemental examinations at a special centre if satisfactory arrangements can be made. Since permission is contingent on completion of arrangements, only early applications will be considered.

In the event that a candidate does not appear for an examination a refund of the required fee will be considered only if, within 10 days after the scheduled examination, the candidate submits to the Registrar an adequate explanation for the failure to write the examination.

If a student, because of exceptional circumstances, is permitted to postpone a supplemental beyond the first regular supplemental examination period he or she will be responsible for the content of the course as currently offered. If the course is discontinued, the supplemental privilege may be cancelled.

REVIEW OF ASSIGNED STANDING

Reviews of assigned standing are governed by the following regulations:

1. Any request for the review of an assigned grade other than for a supplemental examination (in which a request for a review will not be granted), must reach the Registrar within four weeks after the announcement of end of session results (for the Winter Session not later than July 15) and must be accompanied by the necessary fee for each course concerned which will be refunded only if the mark is raised.
2. Each applicant for a review must state clearly why he or she believes the course deserves a grade higher than it received; pleas on compassionate grounds should not form part of this statement. Prospective applicants should remember that under Senate regulations instructors must re-examine all failing grades and indicate in their records that this has been done.
3. An applicant who has been granted a supplemental should prepare for the examination since a change in the original mark is unlikely and the result of the review may not be available before the end of the supplemental examination period.
4. Reviews will not be permitted in more than two courses in the work of one academic year, and in one course in a partial course of 9 units or less or in the work of one spring or summer session.

TRANSCRIPT OF ACADEMIC RECORD

Each statement of marks issued to a student constitutes an unofficial transcript of the student's entire University of B.C. record. Students should retain these statements for their own use until replaced by a further issue.

A transcript of a student's academic record will, on written request of the student, be mailed direct to the institution or agency indicated in the request. An *official transcript* will not be given to a student except in special circumstances when the transcript will be issued in a sealed envelope carrying the inscription *"official transcript only if presented with seal unbroken."*

Each transcript must include the student's complete record at the University of British Columbia. Since credit earned is determined on the results of the sessional examinations, a transcript will not include results of midterm examinations.

Students' records are confidential. Transcripts are issued only at the request of students or appropriate agencies or officials.

No transcript will be issued to or for a student who has not made arrangements satisfactory to the Department of Financial Services to meet any outstanding indebtedness.

Granted Honourable Dismissal indicates that the student is in no disciplinary difficulty at the time the transcript is issued; the term has no reference to scholastic status.

Application for a transcript should be made at least one week before the document is required. The fee is $4.00 each, except that when two or more transcripts are ordered to be issued at one time the fee shall be $4.00 for the first and $1.00 for each additional copy.

Fees for transcripts are payable in advance; transcripts will not be provided until payment is received.

GRADUATION

Every candidate for a degree must make formal application for graduation. Application for graduation must be made not later than February 15 for graduation in May and not later than **August 15** for graduation in the Fall. Special forms for this purpose are provided by the Registrar's Office.

Students are reminded that, because of the extended Winter Session in the Faculty of Medicine, academic results for the First Year are not available from this Faculty in time for Spring graduation. Thus, all applications for degrees by students in the First Year of Medicine will be treated by the Faculty of Science as applications for Fall graduation.

Students completing degree requirements at another institution are also reminded that, because of the delay in obtaining official transcripts, all applications for degrees for such students will be treated by the Registrar's Office as applications for Fall graduation.

No student will be allowed to graduate until all academic fees have been fully paid.

WITHDRAWAL

A student who decides to withdraw must present a statement of clearance, signed by the appropriate Dean, Director or Faculty Adviser, to the Office of the Registrar. The Registrar will then grant Honourable Dismissal and decide whether or not there may be a refund of fees.

The Senate of the University may require a student to withdraw from the University at any time for unsatisfactory conduct, for failure to abide by regulations, for unsatisfactory progress in a program of studies or training, or for any other reason which is deemed to show that withdrawal is in the interests of the student and/or the University.

SPRING SESSION, SUMMER SESSION

The announcement of the courses is issued in March by the Office of Extra-Sessional Studies, and is available on request from the Registrar.

Regulations are as follows:

1. The maximum credit for Summer Session or for Spring Session combined with Summer Session, in any one calendar year, is normally 6 units.
2. All students desiring to obtain formal credit for work done in the Spring Session or Summer Session must be eligible for admission on the same basis as Winter Session students.
3. A student who obtained *Fail* standing during the last Winter Session attended *may* not enrol in Summer Session.

EXTRA-SESSIONAL CREDIT COURSES

Administration for the degree credit courses offered extra-sessionally during Winter Session, Spring and Summer Sessions, off-campus, and with the Directed Study Abroad Program is handled through the Office of Extra-Sessional Studies. Guided Independent Study courses (formerly Correspondence Courses) are administrated through the Office of Guide Independent Study.

EXCHANGE PROGRAMS

Limited opportunities are available for the exchange of students, both graduate and undergraduate, with universities in other countries.

Students interested in investigating these opportunities should arrange an interview with the Office of the Dean of the Faculty in which they are registered. Application for an exchange should be made at least one year prior to the proposed period of study.

GUIDED INDEPENDENT STUDY

Full university degree credit may be obtained in a number of fields by guided independent study courses and other forms of independent study. An upper limit in terms of units or courses of independent study has not been established. In general, a student is not likely to be able to complete more than one-third of a degree program through such study though the precise number of independent study units which may be applied to a degree program will be determined by the specific requirements of the several faculties. Students are advised to enquire at the office of the Dean of the appropriate Faculty before undertaking an extensive program of independent study.

Credit will only be granted for Education courses to students who are registered in The Faculty of Education, hold a Teacher's Certificate or have written permission from the Dean of the Faculty of Education.

Final examinations in guided independent study courses may be written in April, June, August, October, December and February. Standards in the final examinations will be the same as those for resident students. Students who fail in the final examination and the supplemental in any one guided independent study course will not be permitted to register again for that course under guided independent study.

Winter session students may take a credit guided independent study course during the summer months providing they have the written approval of their Faculty Adviser.

STUDENT DISCIPLINE

The President of the University has the right under the University Act (Section 58) to take whatever disciplinary action is deemed to be warranted by a student's misconduct.

Offences

Misconduct subject to penalty includes, but is not limited to, the following offences:

1. Plagiarism.
   Plagiarism is a form of academic misconduct in which an individual submits or presents the work of another person as his or her own. Scholarship quite properly rests upon examining and referring to the thoughts and writings of others. However, when excerpts are used in paragraphs or essays, the author must be acknowleged through footnotes or other accepted practices.
   Substantial plagiarism exists when there is no recognition given to the author for phrases, sentences, and ideas of the author incorporated in an essay.
   Complete plagiarism exists when an entire essay is copied from an author, or composed by another person, and presented as original work.
   (Students in doubt as to what consititutes a case of plagiarism should consult their instructor.)

2. Submitting the same essay, presentation, or assignment for credit in more than one course, unless prior approval has been obtained.
3. Cheating on an examination or falsifying material subject to academic evaluation.
4. Impersonating a candidate at an examination or availing oneself of the results of such impersonation.
5. Submitting false records or information, in writing or orally, or failing to provide relevant or requested information, at the time of admission or re-admission to the University.
6. Falsifying or submitting false documents, transcripts or other academic credentials.
7. Disrupting instructional activities, including making it difficult to proceed with scheduled lectures, seminars, etc., and with examinations and tests.
8. Damaging, removing, or making unauthorized use of University property, or the personal property of faculty, staff, or students; and assaulting individuals, including conduct which leads to the physical or emotional injury of faculty, staff, or students, or which threatens the physical or emotional wellbeing of faculty, staff, or students.
9. Failing to comply with any penalty imposed for misconduct.

Penalties

The following penalties may be imposed, singly or in combination, for any of the above offences:

1. A failing grade or mark of zero in the course, examination, or assignment in which the academic misconduct occurred.
2. Suspension from the University for a specified period of time, or indefinitely.
3. Reprimand, with letter placed in student's file.
4. Restitution in the case of damage to, or removal or unauthorized use of, property.

WARNING:

1. **The penalty for substantial or complete plagiarism, or for cheating, normally is suspension from the University.**
2. **The laying of charges under federal or provincial legislation, or the commencement of civil proceedings, does not preclude disciplinary measures being taken by the University.**

Procedures

Section 58 of the University Act gives the President of the University the power to suspend students and to deal summarily with any matter of student discipline. To advise him on measures to be taken, the President has established the President's Advisory Committee on Student Discipline. An alleged instance of student misconduct deemed serious enough for action by the President shall be referred to this Committee. After an investigation and a hearing at which the student is invited to appear, the Committee reports to the President. The student then has the opportunity to meet with the President, if he or she wishes, before the President arrives at a decision.

A student suspected or apprehended in the commitment of an offence shall be notified within a reasonable period of time of intention to report the alleged offence to the department head, dean, or other appropriate person. The student shall also be given the opportunity to explain the incident and, if he or she requests, to meet with the department head, dean, or other appropriate person, before the alleged offence is reported to the President.

Appeals

A student has the right to appeal against the decision of the President to the Senate Committee on Student Appeals on Academic Discipline.

FEES

1. **The University reserves the right to change fees without notice.** Students who have not completed their course requirements when a change in fees is made will be affected by the change.

2. Fees must be paid by cheque, bank or postal money order or by travellers cheque (payable to "The University of British Columbia").

Fee payment in the Winter Session may be in two instalments (see item 13). In general, the September instalment consists of 50% of the tuition assessment plus 100% of student fees and the January instalment consists of the remainder of the tuition owing. Students enrolled in a study program restricted to the first or second term must pay the full amount assessed by the due date for that term. Graduate students assessed the continuing fee or the on-leave fee must pay the full amount by the due date for the first term.

3. **Undergraduate Tuition Fees**

Fees shown do **not** include student fees nor do they include Laboratory and other Special Fees. See items 6, 7, 8, 9 and 24 for an explanation of these additional fees.

Undergraduate tuition fees are charged on a per unit basis for some programs and on a program fee basis for others.

(a) A fee of $88.00 per unit is charged for the following programs:

Arts
- Bachelor of Arts
- Bachelor of Fine Arts
- Bachelor of Home Economics
- Bachelor of Music in Secondary Music Education (years 4 and 5)
- Diploma Programs

Commerce and Business Administration
- Bachelor of Commerce

Education
- Bachelor of Education
- Bachelor of Education (Secondary) in Music Education (years 4 and 5)
- Diploma and Teacher Training Programs
- Bachelor of Physical Education
- Bachelor of Recreation Education

Science
- Bachelor of Science

Undergraduate Auditors

Illustration of tuition fees charged:

(i) **15 unit program at $88.00 per unit:**

Tuition (15 × $88.00)	=	$1,320.00
Student Fees	=	71.50
Plus applicable student society fee (**see Item 8**)	=	
		$

(ii) **18 unit program at $88.00 per unit:**

Tuition (18 × $88.00)	=	$1,584.00
Student Fees	=	71.50
Plus applicable student society fee (**see Item 8**)	=	
		$

(b) Program Fees are charged for the following programs:
(Part-time students not in per unit fee programs will be assessed on the basis of a percentage of the normal program fee.)

Agricultural Sciences	
Bachelor of Science (Agriculture)	
First Year	$1,602.00
Other Years	$1,716.00[1]
Bachelor of Landscape Architecture	
First Year	$1,602.00
Other Years	$1,716.00
Applied Science	
Bachelor of Architecture	$1,716.00
Bachelor of Applied Science (Engineering)	$1,716.00
Bachelor of Science in Nursing	
First Year	$1,487.00
Other Years	$1,590.00
Arts	
Master of Archival Studies	$1,382.00
Master of Library Science	$1,382.00
Bachelor of Music	$1,475.00
Bachelor of Music in Secondary Music Education (years 1-3)	$1,475.00
Bachelor of Social Work	
Third and Fourth Years	$1,487.00
Fifth Year (Concentrated)	$2,059.00
Dentistry	
Doctor of Dental Medicine	$2,288.00
Diploma Program (Periodontics)	$2,600.00
Residents	$ 166.00
Education	
Bachelor of Education (Secondary) in Music Education (years 1-3)	$1,475.00
Forestry	
Bachelor of Science in Forestry	$1,716.00[2]
Bachelor of Science (Forestry)	$1,716.00[2]
Law	
Bachelor of Laws	$1,773.00
Medicine	
Doctor of Medicine	$2,288.00
Residents and Interns	$ 166.00
Bachelor of Medical Laboratory Science	$1,773.00
Rehabilitation Medicine —	
Bachelor of Science in Occupational Therapy	$1,602.00
Bachelor of Science in Physical Therapy	$1,602.00

Pharmaceutical Sciences

Bachelor of Science in Pharmacy	$1,773.00

Notes

[1] Third Year Agricultural Science students will be assessed a field trip fee of $200.00.

[2] Forestry students taking Forestry 351 and 451 will be assessed a field trip fee of $250.00 and $375.00 respectively.

4. **Unclassified Students**
Qualifying Students
Education Occasional Students

A fee of $88.00 per unit is charged for courses numbered under 500. For courses numbered 500 and above, the fee is $225.00 per unit.

5. **International students** (except those registered in the Faculty of Graduate Studies) will be assessed fees in the amount of 2.5 times the corresponding fee for Canadian Citizens and Permanent Residents (i.e. landed immigrants) by program and year level. Where reciprocity agreements exist, international students shall pay only regular fees.

6. **The Student Activity fee** of $32 is assessed all students in the Winter Session who are enrolled in a program of 9 units or more. Students taking less than 9 units will be assessed at $3.50 per unit. The fee is assessed by the Board of Governors and is used to support athletic and recreation programs and facilities.

7. **The Alma Mater Society fees** are authorized by student referendum and the Board of Governors. They are collected by the university at the request of the Society. Students enrolled in 9 or more units are assessed fees of $39.50 made up as follows:

Operating expenses of the AMS	$13.00
Capital projects (CPAC)	15.00
Intramural sports	4.50
Athletic fee (Intercollegiate)	7.00
	$39.50

Students taking less than 9 units are assessed fees of $4.50 per unit.

8. The Board of Governors approves, on the recommendation of the Alma Mater Society, special fees for Undergraduate Societies. The fees for Winter Session are as follows:

Agriculture (B.Sc. Agr.), and (B.L.A.)	$10.00	Law	$12.00
		Library Science	$10.00
Architecture	$10.00	Medicine	
Arts (B.A., B.F.A., B.Mus. and Diploma Programs)	$ 1.00	First & Second Years	$28.00
		Third & Fourth Years	$38.00
Commerce (B.Com.)	$ 5.00	Nursing	$18.00
Dentistry	$40.00	Pharmacy	$18.00
Education (including Diploma Programs)	$ 2.00	Physical Education	$10.00
		Recreation	$ 3.00
Engineering	$18.00	Rehabilitation Medicine	$ 6.00
Forestry	$30.00	Social Work	$ 5.00
Family and Nutritional Sciences (B.H.E.)	$ 7.00	Science	$ 5.00

9. The Graduating Class fee, authorized by the Board of Governors, is assessed all students in the winter session who are registered in the Final Year of a course leading to a first bachelor's or the M.D. or the D.M.D. degree. This fee of $7 is for the support of student-sponsored graduating class activities. Enquiries with respect to this fee should be directed to the Alma Mater Society.

10. **Prorating of Fees**

A student who withdraws from the University must notify the Registrar's Office either in person or in writing. (See Withdrawal Procedures.) Refund of fees, if any, is calculated from the day on which the Registrar's Office is notified. Fees are not transferable from one session to another.

(i) The following table shows the fees that will be charged students who withdraw from a course or courses after registration. The term "sessional fee" refers to the full tuition fee assigned for the academic year— September to April (for full-time students see para. 20, for part-time students, para. 21).

First Term

During first two weeks of lectures	— assessed 10% of sessional fee, A.M.S. fee and Student Activity fee
During third week of lectures	— assessed 20% of sessional fee, A.M.S. fee and Student Activity fee
During fourth week of lectures	— assessed 30% of sessional fee, A.M.S. fee and Student fee
During fifth week of lectures	— assessed 40% of sessional fee, A.M.S. fee and Student fee

After the fifth week of lectures there is no refund of any part of the first instalment of tuition fees or any of the A.M.S. fee or Student Activity Fee.

Second Term

During first two weeks of lectures	— assessed 60% of sessional fee
During third week of lectures	— assessed 70% of sessional fee
During fourth week of lectures	— assessed 80% of sessional fee
During fifth week of lectures	— assessed 90% of sessional fee

A student who withdraws after the fifth week of second term lectures will receive no refund of fees.

(ii) The following table shows the fees that will be charged students who withdraw from a course or courses after registration in a study program restricted entirely to First Term (September to December), or Second Term (January to April).

Before classes begin	$10.00
During second week of lectures	20% of term fee, A.M.S. fee and Student Activity Fee
During fourth week of lectures	40% of term fee, A.M.S. fee and Student Activity Fee
During sixth week of lectures	60% of term fee, A.M.S. fee and Student Activity Fee
During eighth week of lectures	80% of term fee, and Student Activity Fee

No refund of any part of the course fee for withdrawals after the eighth week of lectures.

(iii) A student upon registering has initiated a contract with the University for payment of assessed fees. This contract applies whether or not there has been any actual payment of fees. Cancellation of registration for non-payment of fees does not remove from the record the amount of delinquent fees.

11. A student registered in one faculty taking the greater part of the studies in another faculty will be assessed the greater of the two faculty and course fees.

12. When permission to register late is granted, a late fee additional to all other fees, will be charged. The late fee is $40 and must be paid with the first instalment of the tuition fee. Refund of this fee will be considered only on the basis of a medical certificate covering illness or on evidence of domestic affliction, and students wishing to appeal may do so, on such grounds, providing they do so in writing to the Fee Appeals Committee, prior to October 31.

Students undertaking summer employment should understand that the late registration fee will not be waived if, because of the employment, they are not able to be present to register during registration week. Such students should honour their summer employment contracts and budget for the late fee as part of their summer financing.

13. A late payment fee of $40.00 additional to all other fees will be assessed if payment of the first instalment is not received by the Department of Financial Services on or before September 18 or the second instalment on or before January 15. Refund of this fee will be considered only on the basis of a medical certificate covering illness or on evidence of domestic affliction. If fees are not paid in full by the following dates registration will be cancelled and the student concerned excluded from classes. First instalment—October 3. Second instalment—January 30.

If a student whose registration has been cancelled for non-payment of fees applies for reinstatement and the application is approved by the Registrar, the student will be required to pay a reinstatement fee of $40.00, the late payment fee of $40.00, and all other outstanding fees before being permitted to resume classes or to be readmitted in a subsequent session.

14. Students from outside the Province of British Columbia must be covered with some form of hospital insurance as a condition of their acceptance to the University. See "The Student Health Service" for details.

15. International Students registered in the Faculty of Graduate Studies are assessed fees on the same basis as Canadian citizens and permanent residents.

16. **Master's Degree Tuition Fees** **$3,000.00**

Except as noted below the minimum fee for the MASTER'S degree is $3,000.00.

A candidate is required to register and pay tuition instalments as indicated below in each successive year following admission to the degree program.

Candidates may elect to pay fee instalments as listed below or on a unit basis of $225.00 per unit, plus applicable authorized student fees. (Fees are assessed for audit courses and theses).

A candidate having paid the minimum tuition fee will, thereafter, pay $520.00 on each subsequent registration plus applicable authorized student fees.

Master's degree tuition instalments (these fees do not include authorized student fees):

First Year	$1,700.00**
Second Year	1,300.00
Each subsequent registration	520.00
On Leave	156.00

Master's Degree and Diploma in Dentistry Tuition Fees **$6,604.00**

Except as noted below the minimum fee for the combined Master's Degree and Diploma is $6,604.00.

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A candidate is required to register and pay tuition instalments as indicated below in each successive year following admission to the program.

First Year	$2,600.00
Second Year	2,600.00
Third Year	1,404.00*
Each subsequent registration	520.00
On Leave	156.00

* Should additional clinical studies be required in the third year of the program a further fee of $1,040.00 will be assessed in the third year.

Combined Master of Business Administration and Bachelor of Laws $6,946.00

Except as noted below the minimum fee for the combined M.B.A./LL.B. degrees is $6,946.00.

A candidate is required to register and pay tuition instalments as indicated below in each successive year following admission to the combined program.

First Year	$1,773.00
Second Year	1,700.00
Third Year	1,773.00
Fourth Year	1,700.00
Each subsequent registration	520.00
On Leave	156.00

The total student fees for a full time Winter Session student are $95.50. These include:

Alma Mater Society	$39.50
Student Activity Fee	$32.00
Graduate Student Centre	$11.00
Graduate Student Centre Debt Retirement	$12.00
Graduate Student Association	$ 1.00
	$95.50

There is an additional student fee of $10.00 for students in Community and Regional Planning.

Spring Session and Part-time Winter Session student fees are assessed as follows: Alma Mater Society $4.50 per unit, Student Activity Fee $3.50 per unit. Summer Session student fees are assessed as follows. Alma Mater Society $2.00 per unit; Graduate Student Centre $12.00 (including $4.00 debt retirement); Summer Session Association $5.00.

** A candidate for the Master's degree who completes degree requirements within 12 consecutive months of first registration in the Faculty of Graduate Studies will be assessed a total tuition fee of $1,700.00 only, plus applicable authorized student fees; or who completes within 18 consecutive months, $2,350.00 only, plus applicable student fees. Candidates who interrupt their studies in the first or second year of candidacy are not eligible for either of these reduced assessments.

A graduate student who has officially withdrawn or been officially dropped from a program for two or more years shall, upon reregistering, be considered for fee assessment purposes, as a first-year student.

17. **Doctoral Degree Tuition Fees** **$4,352.00**

The minimum fee for the Doctoral degree is $4,352.00

A candidate is required to register and pay fee instalments as indicated below in each successive year following admission to the degree program.

All candidates in this degree program are considered to be "full-time" in the assessment of tuition and authorized student fees. Student fees are to be included in the September payment.

Doctoral degree tuition instalments:

First Year	$1,700.00
Second Year	$1,352.00
Third Year	$1,300.00
Each subsequent registration	$ 520.00
On Leave	$ 156.00

A student at this University who transfers to the Doctoral program after exactly one year on a Master's program will pay fees on the same schedule as Doctoral candidates. A student who transfers to the Doctoral program after more than one year on a Master's program will pay the first year Doctoral fees for the first year in the new registration and thereafter the "each subsequent year" fee. These provisions do not apply to Master's candidates who elected to pay fees on a per unit basis.

Student fees:

Alma Mater Society	$39.50
Student Activity Fee	$32.00
Graduate Student Centre	$11.00
Graduate Student Centre Debt Retirement	$12.00
Graduate Student Association	$ 1.00
	$95.50

There is an additional student fee of $10.00 for students in Community and Regional Planning.

A graduate student who has officially withdrawn or been officially dropped from a program for two or more years shall, upon reregistering, be considered for fee assessment purposes, as a first-year student.

18. **Exchange and Visiting Graduate Students**

A graduate student paying regular fees at a Western Canadian University will be registered to take courses unavailable at the home university as an "exchange graduate student" and will be assessed only authorized student fees if there is a reciprocal agreement between the institutions to this effect. Other visiting graduate students will be assessed tuition fees equivalent to the fee charged for a three-unit graduate course; plus fees at the prevailing graduate rate per unit in excess of three; plus authorized student fees.

19. **Qualifying Students**

Applicants not admissible to the Faculty of Graudate Studies who hope to qualify for admission may register as "Qualifying" and will be assessed fees on a unit basis for all courses taken (see para. 4). Fees paid under these circumstances will not subsequently be credited in a graduate degree program. Admissions in this category are limited to students receiving support for their applications by the Departments concerned.

20. **Non-degree Students**

Students not working toward a graduate degree will be registered as "Unclassified" and will be assessed fees on a unit basis (see para. 4).

21. **Baccalaureate Programs — completion of graduating essays**

A student in baccalaureate program who registers for a graduating essay or thesis in a winter session and who is unable to complete the requirements for it, is required to register again in the session in which the essay or thesis is to be submitted and pay a fee of $160 plus approved student fees.

22. **Spring and Summer Session**

Tuition fees payable on Registration (except Graduate Studies): $95.00 per unit

Summer Session Association	5.00
Change of course (Summer Session)	10.00
Graduate Student Centre, Summer Session (including $4.00 for debt retirement)	12.00

Auditor — regular tuition fee.

Spring and Summer Session students are assessed a Student Activity fee of $2.00 per unit. Spring Session students are assessed an AMS fee of $4.50 per unit while Summer Session students are assessed at $2.00 per unit.

(The maximum student fees payable for the period September 1 to August 31 are $39.50 (AMS) and $32.00 (Student Activity).

23. **Guided Independent Study Courses**

Fees will be charged on a per unit basis of $95.00. The fee for a three-unit course is $285.00, plus a non-refundable postage and handling fee of $15.00 for each Guided Independent Study Course.

Refunds will be granted if applied for in writing within thirty days of registration and if course material is returned in new condition.

Refunds are as follows:—

(1) within 30 days, refund $240.00 for 3 units; $120.00 for 1½ units.

(2) no refunds issued after thirty days.

An invigilation fee of $10.00 is payable for examinations held at UBC and other designated centres. Where examinations are permitted at special outside centres the invigilation fee payable is $55.00. Supplemental examination fees are the same as those given under "Special Fees" below.

Forestry 202, 203, 302, 306, 308 (Sections 999) — additional Laboratory fee $65.00

Forestry 405 (Section 999) — additional Laboratory fee $80.00

Forestry 111 (Section 999) — additional Laboratory fee $100.00

24. **Special Fees**

For late registration, winter session	$40.00
Application fee for non-British Columbia documents	25.00
For Late Payment:	
First instalment — after September 17	40.00
Second instalment — after January 14	40.00
Dishonoured cheque	10.00
For late registration, Spring and Summer Sessions	40.00
For reinstatment after cancellation of registration	40.00
Guided Independent Study	
Credit Course Examinations at UBC and at designated centres (per paper)	10.00
Exams at special outside centres (per paper)	55.00
Regular supplemental examination, per paper	25.00
Deferred examination at regular outside centres, per paper	20.00
Supplemental examination at regular outside centres, per paper	30.00
Supplemental examination at special outside centres, per paper	55.00
Special examination (where permitted), per paper	40.00
Review of Assigned Standing, per course	25.00

Co-operative Education Program, fee per course 133.00
Evaluation of practice teaching for teachers trained elsewhere. 264.00
Dentistry, short-term visiting students 50.00
Library (duplicate cards) 6.00

Field Trip fees:
Agricultural Sciences 300 . . . . . 200.00
Architecture 406 . . . . . 400.00
Architecture 512 (extra sessional) 550.00
Geography 309 . . . . . up to 250.00
Forestry 351 (Interior Field Trip) 250.00
Forestry Harvesting 352 . . . . . Variable fee
Forestry 451 (Coast Field Trip) 375.00
Wood Science & Industry 353 . . . . . Variable fee
Geology 335 . . . . . 500.00
Landscape Arch. 199
Accommodation, instruction, administration 117.00
Transportation, meals. . . . . 100.00 - 300.00
Physical Education 232 (scuba diving)
($10.00 NAUI registration fee plus $100 equipment rental). 110.00
Zoology 205 (optional field trip) . . . . . variable
Zoology 415 . . . . . variable
Zoology 416 . . . . . variable
Zoology 430 . . . . . variable

Industrial Education Division — additional fees:
3rd year regular program — 16½ unit load $200
4th year regular program — 16½ unit load $200
Accelerated program — 24 units $200
Summer Session — 3 unit load . . . . . $ 25
Summer Session — 6 unit load . . . . . $ 50

Laboratory Fees:
Agricultural Sciences:
Plant Science 324 . . . . . 4.00
Plant Science 336 . . . . . 5.00
Plant Science 338 . . . . . 5.00
Landscape Arch. 220 . . . . . 7.50
Landscape Arch. 350 . . . . . 11.00
Landscape Arch. 450 . . . . . 7.50
Applied Science:
Nursing 101 . . . . . 25.00
Nursing 201 . . . . . 50.00
Nursing 301 . . . . . 25.00
Nursing 302 . . . . . 25.00
Nursing 403 . . . . . 50.00
Arts
Fine Arts 181 . . . . . 50.00
Fine Arts 281-290 (each course) 30.00
Fine Arts — 9 units from 380, 381, 382, 384, 385 . . . . . 55.00
Fine Arts 383 *and* 6 units from 380, 381, 382, 384, 385 . . . . . 120.00
Fine Arts 387, 389 . . . . . 50.00
Fine Arts 388 . . . . . 65.00
Fine Arts — 12 units from 480, 481, 482, 484, 485. . . . . 55.00
Fine Arts 483 *and* 7½ units from 480, 481, 482, 484, 485 . . . . . 120.00
Fine Arts 486 (except printmaking) 50.00
Fine Arts 486 (printmaking) 65.00
Music 309 (orchestra). 25.00
Theatre 230 and 330 . . . . . 30.00
Theatre 334. . . . . 50.00

Education:
Music Education:
Music Education 302 . . . . . 15.00
Music Education 324 . . . . . 5.00
Music Education 404 . . . . . 10.00

Art Education:
Art Education 100 . . . . . 20.00
Art Education 323 . . . . . 17.00
Art Education 305 . . . . . 20.00
Art Education 405 . . . . . 20.00
Art Education 415 . . . . . 20.00

Library, Archival and Information Studies:
Librarianship 620 . . . . . 60.00

Pharmaceutical Sciences:
Pharmacy 110, 210, 310 . . . . . 15.00
Pharmacy 325 . . . . . 20.00

Rehabilitation Medicine:
Rehabilitation Medicine (per year) 100.00

Science:
Biology 101/2 . . . . . minimum 10.00
Biology 200 . . . . . minimum 9.00
Biology 315 . . . . . minimum 12.00
Biology 330 . . . . . minimum 10.00
Biology 340 . . . . . 14.00
Botany 209, 210, 301, 330 . . . . . 5.00
Botany 412 . . . . . 10.00
Chemistry 103, 110, 120, 150, 201, 202, 203, 205, 208, 230, 255, 304, 305, 310, 311, 313, 330, 335, 352, 415, 421. . . . . **6.00/unit
Geol. Sci. 200, 201, 226, 256, 303, 321, 403, 406, 416, 418, 421, 428, 431, 447, 449, 499 . . . . . **6.00/unit
Physics 120 . . . . . 10.00
Physics 307 . . . . . 5.00
Physics 319 . . . . . 5.00
Zoology 153 . . . . . minimum 10.00
Zoology 203 . . . . . minimum 10.00
Zoology 205 . . . . . minimum 5.00
Zoology 303 . . . . . minimum 6.00
Zoology 304 . . . . . minimum 5.00
Zoology 402 . . . . . minimum 2.00

**Maximum payment per student of $36.00 per year.

Calendar Mailing Fees:
Canada $3.00
U.S.A. $3.50
Outside Canada (excluding U.S.A.) $7.00

Fees for transcripts of academic record $4.00 each, except that when two or more additional copies are ordered to be issued at one time the fee shall be $4.00 for the first and $1.00 for each additional copy. Fees for transcripts are payable in advance; transcripts will not be provided until payment received.

Library — extramural services. Fees have been authorized for extramural borrowing. Information concerning these fees may be obtained from the Librarian.

Indebtedness

In respect of non-payment of academic fees subsequent registration will be denied; no transcripts of academic record will be issued and the student will not be allowed to graduate until all academic fees have been fully paid.

In respect of any other indebtedness to the University, subsequent registration will be denied until these accounts are fully paid.

UNIVERSITY SERVICES AND FACILITIES

Office of Awards and Financial Aid

The University offers a wide range of programs to recognize students with high academic achievement and provide financial aid to those who cannot meet basic educational costs. Academic awards for undergraduate study as well as all need-based awards are administered by the Office of Awards & Financial Aid. Academic awards for students in graduate studies are administered by the Faculty of Graduate Studies. General information on prizes, scholarships, bursaries and loans is provided in this Calendar under the heading Awards and Financial Aid (see Index). Detailed information on awards and application procedures is included in the publication entitled "Awards and Financial Aid, The University of British Columbia", which is available from the Awards Office. The Awards Office is located in the General Services Administration Building (Room 50), 2075 Wesbrook Mall, Vancouver, B.C. V6T 1W5. Telephone (604) 228-5111. The Faculty of Graduate Studies is located in Room 235 of the General Services Administration Building. Telephone (604) 228-4556. Both offices are open from 8:30 a.m. to 4:00 p.m., Monday through Friday.

STUDENT COUNSELLING AND RESOURCES CENTRE

The Counselling Centre has six main functions: (a) counselling, (b) orientation, (c) school and college liaison, (d) testing, (e) student resources, (f) physically disabled students.

Enquiries should be addressed to the Director, Student Counselling and Resources Centre, University of British Columbia, 200-1874 East Mall, Vancouver, B.C. V6T 1W5 (228-3811).

(a) *Counselling:* Organized counselling services staffed by trained counsellors are available for students either registered at the University or those considering registering. The Counselling Centre offers the students an opportunity to discuss, in a confidential and professional setting, any matter that may be of concern to them. This might include concerns regarding career and educational choice, or students may wish to have assistance with concerns of a more personal nature that seem to be

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impairing their University performance. The emphasis is on helping students to increase competence in determining realistic goals and in choosing rational means of attaining them. On matters dealing with course requirements and pre-requisites for study programs for specific objectives, students should consult advisers in the faculty in which they are registered or plan to register. The office is open during the summer months and it is particularly desirable that students planning to enter the University secure an interview during June, July and August.

(b) *Orientation:* An important function of the Counselling Centre is to assist new students in their adjustment to the demands of university life. A variety of methods are employed in orientation. All new students receive an invitation to take part in a day, evening or weekend orientation program held during July and August. Special orientation groups are also arranged for the parents of new students during the summer months. Counsellors visit all the secondary schools in the Province to meet with prospective students. Students considering The University of British Columbia can arrange an individual counselling appointment at any time during the year. Many secondary schools arrange for senior students to visit The University of British Columbia during the Winter Session for campus orientation. Publications such as "Careers," "Tinker Tailor," 'Information for Prospective UBC Students," "UBC and the Adult Student," etc. aid in the orientation process.

(c) *School and College Liaison:* The Counselling Centre maintains a close contact with secondary school and college counsellors and principals. Annual conferences are hosted by the colleges. Secondary school counsellors attend these conferences to keep informed about changes at The University of British Columbia and the other provincial post secondary institutions. A newsletter is sent to all school and college counsellors describing new University of British Columbia programs and helping to keep counsellors aware of The University of British Columbia requirements. School and college principals receive an annual report on the progress of graduates from their institutions at The University of British Columbia. Counsellors from the Counselling Centre visit all secondary schools and most colleges to meet with students considering attending The University of British Columbia.

(d) *Testing:* A program of voluntary aptitude testing is available to all students who are attending the University. The purpose of these tests is to provide assistance to students in determining educational and career goals. The results of these tests will not, in themselves, indicate definite objectives. When measures of aptitude, achievement and interest are used in conjunction with other information, they often can assist students to choose satisfactory and realistic goals.

For those wishing to write the career and educational aptitude tests, arrangements can be made by contacting the Counselling Centre. Testing and consultation are available for students throughout the year. No fee is charged for this service.

Students wishing to write the following tests can obtain further information at the Counselling Centre:

The College Entrance Examination Boards
The Graduate Record Examination
Graduate Management Admission Test
Test of English as a Foreign Language
The Law School Admission Test
The Dental Aptitude Test
The Medical College Admission Test
Miller Analogies Test
UBC English Evaluation Test for non-native speakers

(e) *Student Resources:* To assist students, the Counselling Centre maintains a Resource Library containing self-help books; career and faculty information files; calendars from Canadian and foreign universities; information and free booklets on campus and community resources; copies of Christmas and final exams from previous years; and audio-visual material including career information and coping with personal problems. Students seeking volunteer jobs for career related experience or personal development can make use of the information and referral services offered by Volunteer Connections. Each term free workshops are offered in areas such as study skills, job search techniques, career exploration and personal growth.

(f) *Physically Disabled Students:* A number of specialized services including counselling, equipment loans and pre-registration are made available to physically disabled students by the Counselling Centre. These services and other resources are described in the booklet "Information Guide for Physically Disabled Students". An appointment can be made with a counsellor familiar with the concerns of disabled students by calling the Counselling Centre.

CANADA EMPLOYMENT CENTRE

The Canada Employment and Immigration Commission operates a year-round student placement service on campus. Services are provided at no cost, either to student or to employer. This office assists students in obtaining permanent, part-time and summer employment and free interviewing facilities are provided for employers. Applications for employment to work in the library and during registration week are accepted in August, while registrations for summer employment are accepted in March. Graduating students should register for permanent employment in April. The Centre is located in Room 214, Brock Hall.

OFFICE FOR WOMEN STUDENTS

The Office for Women Students counsels women students and prospective students with personal, educational, financial, social, and career concerns. The office initiates programs and workshops in response to students' needs, and acts in a liaison capacity between students and faculty or administration.

The staff of the Office for Women Students welcome discussion with high school and community college graduates and with women returning to education after a number of years. Career counselling services are available to women in all Faculties and Professional Schools.

The Office is located in Brock Hall, room 203. The Mildred Brock Lounge for women students is nearby. Office hours are 8:30 a.m. to 4:30 p.m., Monday to Friday; telephone 228-2415.

CHILD CARE FACILITIES

There are nine child care centres, an after-school care program and several preschools on campus. All are independent non-profit parent run societies. Space is limited. Applications should be made early. Contact the Child Care Coordinator, Hut 90, 2855 Acadia Road, Vancouver, B.C., V6T 1S1 (228-5343) for information and applications.

STUDENT HOUSING

On-Campus Accommodation

Single Students

Furnished residence accommodation is available for single students during Winter Session (September 1–April 30) on a room-and-board basis in Place Vanier and Totem Park Residences, or, on a room-only basis in Walter H. Gage Residence. Year-round, room-only, furnished accommodation for senior students is available in the Fairview Crescent Townhouses. Occupancy of the Fairview Crescent facility cannot be expected until November 1, 1986 due to commitments to house Expo '86 staff until then. Information booklets, application forms and rate sheets for Place Vanier, Totem Park, Walter Gage and Fairview Crescent Residences are available from the Student Housing Office, 2071 West Mall, The University of British Columbia, Vancouver, B.C. V6T 1Y9, or phone 604-228-2811. The office is open Monday to Friday, 8:30–4:30 and is closed on weekends and statutory holidays.

Family Accommodation

Three hundred and ninety unfurnished apartments and townhouses are available on a yearly tenancy basis in the Acadia Park development, for married students with families.

Families should apply to: Family Housing, The University of British Columbia, 2071 West Mall, Vancouver, B.C. V6T 1Y9 or phone 604-228-4411.

Residence Advisers

Some positions as Residence Advisers are offered each year to students who have demonstrated ability to relate well to others in a community environment, to maintain high academic standards, and to participate actively in student life in residence. Application forms are available in early January at the Student Housing Office. Personal interviews are necessary.

Off-Campus Accommodation

Listings from off-campus landlords are posted in the Off-Campus Housing Office of the Student Housing Office in the Ponderosa Building. For information, please phone 228-2176.

International House provides help in finding off-campus accommodation for foreign students. Telephone: 228-5021.

Theological Colleges provide a limited number of beds in the following residences. Contact the Dean of Residences directly.

Carey Hall, Baptist (Men)	224-4308
St. Andrew's Hall, Presbyterian (Men)	224-7720
Vancouver School of Theology (Men and Women)	228-9031

THE STUDENT HEALTH SERVICE

1. The Student Health Service is located in the Acute Care Unit, Health Sciences Centre Hospital. Reception room is Main Floor Room M334, telephone number is 228-7011. Clinic hours are Monday-Friday 7.45 a.m. to 5.00 p.m. while Winter Session classes are scheduled and 8.00 a.m. to 4.00 p.m. the remainder of the year. There is an Emergency Department in the Acute Care Unit where help is available for acute injuries or sudden illness, when the Health Service is closed.

The Student Health Service is available for the use of all currently registered UBC students who are taking credit courses. The unit is staffed by qualified personnel and is not part of the teaching facility of the Health Sciences Centre.

Services include care of illness or injury, preventive medicine, counselling and antigen and immunization administration. When necessary, hospitalization will be arranged in a hospital, either on or off campus, depending on the type of facility required.

2. **Medical Requirements for Registration.**

The University reserves the right to insist upon a medical examination if circumstances warrant.

3. **Routine Regarding Absence due to Sickness and Injury**

(a) Students absent from December or April examinations must submit a certificate obtained from a doctor **during** their illness. This certificate must be in the Health Service office within the current examination period.

(b) Students absent at other times during the session because of illness should report their absence to their instructors. A physician's statement of illness is not required.

4. **General Information on Medical and Hospital Insurance**

(a) Hospital Insurance

(i) Students who are classified as residents of B.C. are entitled to B.C. Hospital Insurance benefits.

(ii) Students who are not classified as residents of B.C. are not eligible for payment of hospital costs under the British Columbia Hospital Service. Please make enquiries re eligibility for residence at BCHIS office, Tel. No. 668-2406.

All Canadian provinces accept responsibility for hospital costs for their students attending The University of British Columbia provided the hospital insurance premiums (where required) have been paid.

Students who attend UBC and are not residents of Canada are required, as a condition of registration, to have adequate medical and hospital insurance coverage. Further information will be printed in the Registration Guide.

(b) Sickness Insurance

It is advisable for all B.C. residents to have coverage under the Medical Services Plan of B.C. Unmarried students whose parents are enrolled in the M.S.P.B.C. are insured as dependents until their 19th birthday. The coverage may be continued if the student is in full-time attendance at university and mainly dependent on his parents, **but the Plan must be notified of these facts**, otherwise coverage ceases on the 19th birthday.

For students who are not covered by their parents' medical insurance plan, the following plan is available:—

Medical Services Plan of B.C.: Students covered by this Plan as individual subscribers may be eligible for a subsidy.

Students who have not established residency (see 4 para. (a) (ii) above) are not able to purchase this plan. Coverage should be maintained in the home Province.

For further details consult the Health Service or the Medical Services Plan of B.C., Tel. No. 669-4211, New Enrolment Office or write to M.S.P.B.C., 1410 Government Street, Victoria, B.C., V8W 1Z2.

Students who allow their insurance to lapse will be billed directly.

5. The following Faculties and Schools have special requirements; please see the appropriate calendar section:

Faculty of Medicine and School of Rehabilitation Medicine.

Faculty of Dentistry.

School of Nursing — undergraduate and graduate programs.

THE UNIVERSITY LIBRARY

The University of British Columbia Library is the second largest library in Canada, with over 7,150,000 items including microforms. It serves the University through a system of libraries.

Library Orientation

Tours and orientation programs are offered at the beginning of winter and summer sessions. Times will be posted. Tours may also be arranged at other times.

The Library publishes numerous guides and leaflets explaining the organization of the system and outlining the resources and services available. These may be picked up at information and reference desks throughout the system.

Main Library (Main Mall, west of Student Union Building)

Holds research collections in humanities, social sciences and physical sciences and offers specialized reference services in these areas. Includes separate divisions for Fine Arts, Government Publications, Microforms, Maps, and Special Collections.

Branch Libraries

Sedgewick Library (Main Mall)

Serves undergraduates in Arts and in first and second year Science and Engineering. All campus libraries are open to undergraduates, but Sedgewick is usually the best source of the materials they need.

Asian Studies Library	Asian Centre
Crane Library Braille, large print, and tape-recorded materials.	Brock Hall
Curriculum Laboratory	Education Building, Top Floor, centre block,
Data Library	Computer Sciences Building, Room 206
Film Library	Library Processing Centre, Room 316
Law Library	Law Building
MacMillan Forestry Agriculture Library	MacMillan Building, Room 360
Mathematics Library	Mathematics Building, Main floor, south wing,
Music Library	Music Building, Fourth Floor
Social Work Library	Graham House, Basement
Wilson Recordings Collection	Sedgewick Undergraduate Library
Woodward Biomedical Library	Medical Sciences Complex
Biomedical Branch Library	Vancouver General Hospital
Hamber Library	Children's Hospital
St. Paul's Library	St. Paul's Hospital

Services

Reference assistance is available in all campus libraries. Other services such as photocopying, and inter-library loan are also provided. Hours of service are posted in each library.

Extramural Services

Although the Library's collections and services are maintained primarily for UBC students and faculty, they may also be used by persons outside the University whose studies cannot be pursued in other libraries in the province. Those who qualify as extramural borrowers may purchase library cards at the Circulation Division, Main Library.

COMPUTING CENTRE

The facilities of the Computing Centre are available for research and teaching. The Centre operates an Amdahl 580, an Amdahl V8, an Amdahl V7A, and IBM 4381 central processors under the Michigan Terminal System, providing on-line time-shared facilities throughout the day and night. Over 1,500 terminals and many personal computers are connected to these four hosts and other hosts on and off campus through a Packet-Switched campus network.

The staff of the Centre includes Systems and Communications Groups responsible for maintenance and development of the operating system and the Campus network, and an Applications Group that provides consultation and programming service for users of the Centre. Non-credit courses in programming and computer use are offered to supplement the regular courses given by the Department of Computer Science.

CENTRE FOR CONTINUING EDUCATION

The Centre for Continuing Education was created in July, 1970, replacing the Department of University Extension, which since 1936 had served adults in British Columbia.

The Centre for Continuing Education offers opportunity for university-level continuing education in the following areas:

1. continuing professional and technical education in cooperation with Faculties, Schools and Institutes, in the fields of architecture, community and regional planning, computer science, engineering, and family and nutritional sciences.
2. certificate and diploma programs in engineering, forestry and site planning;
3. general non-credit or liberal education courses in humanities, sciences, languages, creative arts, social sciences and public affairs, designed to give individuals a greater knowledge of themselves and their environment and an opportunity to develop their intellectual abilities.

The Centre is also involved in experimental projects and programs specially designed to focus on community problems and the unique interests of adults.

Other educational services of the Centre include: English for foreign students, Reading and Study Skills Centre, Writing Improvement Program and the Women's Resources Centre.

The Centre is located at the northeast corner of the campus on Chancellor Boulevard between Wesbrook Mall and Newton Crescent.

For calendars and bulletins relating to specific program areas, contact the Centre at (604) 222-2181 or write Centre for Continuing Education, 5997 Iona Drive, The University of British Columbia, Vancouver, B.C. V6T 2A4.

Registration

Registration for courses may be made by mail or in person at the Centre. Application forms for registration may be obtained by telephoning or writing the Centre. Enrolments are accepted in the order received and must be accompanied by full fee. Persons are admitted to classes only after full course fee has been paid.

Fees

Fees vary for courses and are listed in the Centre calendars and special program brochures. Some courses are open to senior citizens at a reduced fee.

Reading, Writing and Study Skills Centre

The UBC Reading, Writing and Study Skills Centre offers non-credit courses for students and others who wish to improve their learning and communication skills for academic, professional or personal reasons.

The English Composition Workshops are designed for students in English 100 and others preparing for the UBC English Composition Test.

Courses begin in September, January, April and July and are held in the Reading, Writing and Study Skills Centre, 2042 West Mall (Hut M-17). Pre-registration is required.

For information write the Reading, Writing and Study Skills Centre, Centre for Continuing Education, or telephone 222-5245.

Language Institute (English as a Second Language)

The English Programs Division offers English as a Second Language courses to students who wish to improve their ability to use English.

The English for Communications program is designed to improve the student's listening and speaking skills; the English for Academic Purposes program is designed to improve the student's reading, writing and grammar skills. Both programs offer special interest courses and English for Special Purposes courses during the year. Students can register for these daytime courses on a full- or part-time basis. Twelve-week sessions begin in September, January and April. A six-week session starts in July.

A College Preparation in English course is offered four times a year for students who intend to study at colleges or universities where instruction is given in English.

The Division also offers three courses, FELT 010, FELT 020, and FELT 030, for foreign students who have been admitted to UBC but who are required to do supplementary work in English.

Evening classes are offered in the Fall and Winter Terms.

All courses are NON-CREDIT and do not guarantee admittance to a university.

For further information write or phone the English Programs Division, Language Institute, Centre for Continuing Education, 222-5285.

CANADIAN ARMED FORCES SUBSIDIZATION PLANS

General

The high professional ability required of present day military officers demands the best in education and training. The Department of National Defence therefore sponsors programs of university education and leadership training for selected young men and women who have the potential to become officers in the Canadian Armed Forces. The admission standards are high, but for those who qualify the way is open to a challenging and rewarding career.

The programs sponsored are the Regular Officer Training Plan (ROTP), Medical Officer Training Plan (MOTP) and Dental Officer Training Plan DOTP). Training given under these plans is divided into two parts: normal attendance at university throughout the academic year and military training each summer. A period of compulsory military service is a condition of acceptance to any of these plans.

ROTP

This plan combines university subsidization with career training as an officer in the Regular component of the Canadian Forces. Successful applicants are enrolled in the rank of Officer Cadet. They are required to maintain a good standing both academically and militarily while in the plan. All tuition and other essential fees are paid by the Department of National Defence. As well, a monthly salary is paid to cover living expenses. Free medical and dental care is provided. Annual leave with full pay and allowances may be granted each year, usually before and after the summer training period. On graduation the Officer Cadet is commissioned as an Officer in the rank of 2nd Lieutenant.

Undergraduate students are also elibible to apply for this program provided they have at least one full year remaining before graduation.

MOTP

Subsidization is provided under the Medical Officer Training Plan for a maximum of three years and nine months of the final years of study in a faculty of medicine, including compulsory internship. It consists of paid tuition, paid book and instrument expenses, complete medical and dental coverage, paid holidays and a monthly salary for living expenses. A successful MOTP applicant is enrolled in the rank of 2nd Lieutenant, promoted to the rank of Lieutenant on the day he/she commences internship and to the rank of Captain the day he/she becomes licensed to practice medicine.

DOTP

Subsidization is provided under the Dental Officer Training Plan for a maximum of three years and nine months of the final years of study in a faculty of dentistry. It consists of paid tuition, paid book and instrument expenses, complete medical and dental coverage, paid holidays and a monthly salary for living expenses. A successful DOTP applicant is enrolled in the rank of 2nd Lieutenant and is promoted to the rank of Captain the day he/she receives a license to practice dentistry.

Admission Requirements

An applicant must:

a. be a Canadian citizen;
b. be physically fit for enrolment in the Canadian Forces; and
c. If ROTP — be at least 16 years of age on the first day of January of the year he/she commences first year studies at university, or
if MOTP or DOTP — be at least 17 years of age.

How to Apply

Individuals interested in obtaining more information on, or wishing to make application for, any of these plans are requested to contact:

Commanding Officer
Canadian Forces Recruiting Centre
547 Seymour Street
Vancouver, B.C. V6B 3H6

THE UNIVERSITY BOOKSTORE

The UBC Bookstore, in its new 55,000 sq. ft. premises on University Boulevard, is one of the largest bookstores in North America.

The Bookstore is prepared to supply all course supplies required by students, including books, note-books, instruments and all kinds of specified and general supplies. As the major academic bookstore in British Columbia the UBC Bookstore regularly stocks a wide range of general and academic titles for the convenience of students, faculty and staff of the university, as well as professional and business people and the general public. In addition, the Bookstore specializes in electronic calculators, microcomputers and software.

Normal hours are 8:30 a.m. to 5:00 p.m., Monday, Tuesday, Thursday, Friday; 8:30 a.m. to 8:30 p.m., Wednesday; 9:30 a.m. to 5:00 p.m., Saturday: extended hours are announced at the start of each Session.

To allow students the choice between buying new books and used books, the Bookstore will re-purchase from students used books, in good condition, up to the estimated requirements of the next regular session.

The UBC Bookstore is owned and operated by the University, on a self-sustaining financial basis, with respect to both operating and capital development costs, in accordance with the requirements established by the Board of Governors.

Any comments or suggestions, with respect to the operation and services of the Bookstore should be addressed to the Director, or to the Chairman, President's Bookstore Committee, c/o the Bookstore.

TRAFFIC AND PARKING

General. Regulation of traffic and parking is enforced on the campus. Brochures outlining traffic and parking regulations are available at the Traffic Office. These regulations remain in effect throughout the year, and all faculty, staff and students of the University, and visitors, are responsible for familiarizing themselves with them. No parking is allowed on roadways or in any area not designated for parking.

Registration. Members of the University wishing to park motor vehicles on campus during the daytime, are required to register them and to obtain appropriate parking permits, for which a fee will be charged. Permits are obtainable at the Traffic Office. Pay parking lots and meter parking areas are available for visitors.

ATHLETIC, INTRAMURAL SPORTS AND RECREATIONAL UBC PROGRAMS

Opportunities are available at The University of British Columbia for students to participate in a wide variety of sports related activities. In co-operation with the School of Physical Education and Recreation and the Alma Mater Society, the University sponsors an extensive Intercollegiate, Intramural and Recreational sports program. Students are encouraged to participate in the activities which best suits their needs.

Students who meet university athletic eligibility requirements are encouraged to try out for any one of several sports administered through the Men's and Women's intercollegiate programs. In competition with other universities, UBC has established a reputation as being one of the most outstanding universities in Canada.

The Intramural and Recreational sports programs provide on-campus facilities for competitive and drop-in sports for faculty, staff and students. Over 10,000 participants are attracted annually to these programs. Opportunities are also provided for those who wish to participate in self-directed sport activities. Facilities such as the Tennis Bubble and the Osborne Centre can be booked for this purpose.

For the use of the Thunderbird Winter Sports Centre and the Aquatic Centre, contact must be made with the administrative offices located in each facility.

For further information on any of the above programs, please contact the appropriate offices listed below:

General Information 228-2531
Room 208, War Memorial Gym
Men's Athletics 228-2503
Room 208, War Memorial Gym
Women's Athletics 228-2295
Room 208, War Memorial Gym
Intramurals 228-2401
66 Sub Plaza
Recreational Sports 228-3996
Room 203, War Memorial Gym
Tennis Centre 228-4396
Osborne Centre, South Campus

FACILITIES FOR PHYSICAL EDUCATION AND RECREATION

War Memorial Gymnasium

The Memorial Gymnasium was officially dedicated on October 26, 1951. This building, which cost approximately $800,000, was the result of a student-alumni campaign to honour the men and women of British Columbia who served in World Wars I and II. It was financed by public subscriptions, a Provincial Government grant, and in major degree by a special student levy. Accommodating about 2,500 spectators in the main hall, it contains also weight training facilities, Human Performance Laboratories, and offices of the School of Physical Education and Recreation and the Athletic Department. There are four outdoor tennis courts adjacent to the War Memorial Gymnasium. The William Eugene MacInnes Field which is situated in an area north of the War Memorial Gymnasium. This field was made possible by contributions from Mr. and Mrs. W. H. MacInnes in memory of their son, a graduate of this University in the combined course of Arts and Mining Engineering.

Aquatic Centre

The open-air swimming pool which adjoins the Memorial Gymnasium was completed in 1954 to provide for the swimming and diving events of the British Empire and Commonwealth Games. A gift from the British Empire and Commonwealth Games Canada (1954) Society, the pool is 50 feet wide and 165 feet long. The diving tower accommodates both 5- and 10-metre events. The pool is now an integral part of the Aquatic Centre.

The indoor aquatic facility, completed in September, 1978, was made possible as a combined project of the students and Administration of UBC, funded by grants from the Alma Mater Society, the Board of Governors, the Federal and Provincial governments, UBC Alumni Association, Foundations as well as donations from faculty and staff on campus, and the citizens of B.C. The 5.8 million dollar complex includes the main pool of unique design which embodies eight 50-metre lanes, eight 25-metre lanes and six 25-yard lanes, a 5-metre diving platform as well as one-metre and three-metre diving boards. Included in the Centre is the John M. Buchanan Fitness and Research Area, which provides a variety of sophisticated facilities for health and fitness specialists and those in need of their services.

Thunderbird Park

Thunderbird Park was developed in the south campus and was officially opened in June, 1967.

Thunderbird Park embraces an area of more than 60 acres and contains the Thunderbird Stadium, the Winter Sports Centre, the Wolfson Field, the O. J. Todd Field, the Arthur Lord Field, the Frank Buck Field, the Chris Spencer Field, the Whit Matthews Field, the Harry Warren Field, the Malcolm McGregor Field, the John Owen Pavilion, the Harry Logan Track, the Evelyn Lett Field and one unnamed field, six outdoor tennis courts and the tennis bubble which contains four indoor courts, and the Osborne Centre. The Arthur Lord field and the tennis courts had lights installed in the spring of 1979.

The Chris Spencer Field was made possible by the generosity of the Chris Spencer Foundation, supplemented by contributions from friends of the University interested in cricket and field hockey.

The Wolfson Field was developed as a result of a gift from the Wolfson Foundation, London, England, made through the British Columbia Playing Fields Association. The Wolfson Field and the Evelyn Lett field have been rebuilt on a new sand-cellular system and was opened for play in September, 1980.

The Robert F. Osborne Physical Education Centre

Unit I was completed in January 1970. Financed by the Board of Governors at an approximate cost of $900,000.00, it consists of two gymnasia (with floors of 75′ x 120′), locker rooms, and two classrooms.

Unit II, consisting of two gymnasia, locker rooms, offices and a Physical Education reading room was completed in March, 1972. It was financed by the Board of Governors at a cost slightly in excess of $500,000.

The Centre, named in honour of the retired Director of the School includes a covered outdoor area which has an asphalt surface, to accommodate floor hockey and various team practices.

Winter Sports Centre

A Winter Sports Centre, consisting of a hockey rink with an ice surface of 200 feet by 85 feet surrounded by seating accommodation for 1284, a curling area with six sheets of ice, and a lounge and snack bar, was opened officially on October 25, 1963. The Centre, constructed at a cost of $500,000.00, was made possible by generous donations from the Alma Mater Society, the University, the Molson Foundation, and the support of the Federal-Provincial Winter Works Program. It is operated by the Winter Sports Centre Management Committee which is composed of two representatives of the University, two of the Alma Mater Society, and two of the residents of the adjoining residential area. In December, 1969 an expansion was completed and put into use. This new addition, financed from past and projected revenues at a cost of approximately $1,000,000.00, contains four squash and two handball courts, several dressing rooms and ancillary rooms, and two ice surfaces. The ice area provides for two hockey rinks, 80′ x 185′, with removable dasher boards in the centre.

Thunderbird Stadium

The stadium, constructed at a cost of more than $1,000,000.00, was opened on October 7, 1967. It can accommodate 3,200 spectators under cover of a roof uniquely suspended by cables supported by twelve reinforced concrete columns topped with huge concrete Thunderbirds. The building contains several dressing rooms, press and television facilities, a fully equipped training room and offices. It was financed by the Board of Governors as a replacement for the original stadium which had been made possible by the contributions of students and faculty.

A conventional lighting system was installed in the Thunderbird Stadium early in 1980 to accommodate night football, rugby and soccer games.

John Owen Pavilion

The John Owen Pavilion was originally opened on June 6, 1967, when it was dedicated to the late Johnny Owen, former Trainer to the countless University teams for over 20 years. In 1981 the Pavilion underwent an extensive $250,000.00 upgrading and renovating program to facilitate the integration of a new and inovative concept that encompassed the School of Physical Education and Recreation, the Department of Family Practice and the British Columbia Sport Medicine Clinic.

The Armoury

The Armoury, located in the north campus, is used for activities such as tennis, indoor track and field, and various team practices. It contains four indoor tennis courts and two dance studios.

Tennis Bubble

The Tennis Bubble holds 4 indoor courts and was officially opened in March of 1984. The project was a joint venture involving Tennis Canada and the School of Physical Education and Recreation.

The courts are open to the public and the campus community.

COMMUNITY RELATIONS DEPARTMENT

This department provides a comprehensive community relations program. The department's primary aims are to increase public understanding and support for the University, encourage public use of University facilities and campus attractions, and promote improved liaison between the private and public sectors and University experts. The department provides the news media with accurate and timely information on University research activities and other matters of public interest. The department publishes *UBC Reports*, a newspaper that provides accurate information on University policies and events. Community Relations also provides general public relations and counselling services for UBC academic and administrative units on all aspects internal and external communications. The telephone number for Community Relations is 228-3131.

PERSONNEL SERVICES

The Department of Personnel Services has responsibility for personnel and labour relations of the non-teaching staff of the University.

Functions and services include recruitment and selection of staff; manpower planning and development; negotiation and interpretation of collective agreements; job evaluation and classification; salary administration and the interpretation of related policies; pension and benefits administration for both faculty and non-teaching staff; maintenance of all employment records for faculty and non-faculty; and occupational health and safety policies, practices.

FOOD SERVICES

The **Food Services Office** is located on the upper level of the Ponderosa Building at the corner of West Mall and University Boulevard. It is open Monday through Friday from 8:30 a.m. to 12 noon and from 1:00 p.m. to 4:30 p.m. Food Service outlets are located throughout the campus.

Subway Cafeteria, UBC's largest cafeteria, conveniently located on the main level of the Student Union Building. Extensive menu selection: salad bar, custom sandwich bar, omelette bar, grill items, beverages, snacks, baked goods, daily specials. 228-3461.

Bus Stop Cafeteria. Enjoy the efficient friendly waitress service for which the Bus Stop is famous. Short order menu and daily specials. Or if you are on the run, pick it up at the take-out counter. Located in the centre of the campus next to the Old Bookstore. 228-3256.

The Express. New exciting take-out service with limited seating area for snacks, beverages, custom sandwich bar and deli items. Located in the Old Bookstore on the Main Mall next to the Bus Stop.

I.R.C. Snack Bar. Efficient, cheery staff provide convenient take-out service. Beverages, snacks, sandwiches, and hot soup for those cold blustery days. At the East end of the Lounge in the **Instructional Resources Centre**. Tel. 228-4291.

Yum Yum's. UBC's authentic popular Chinese food outlet. Food is delicious and reasonable. Served 11:00 a.m. to 2:00 p.m. Full snack bar service including salad bar and custom sandwich bar. Beer and wine available. Tel. 228-2569.

The Barn. Popular spot in the South Campus for tasty burgers, sandwiches, baked goods, custom sandwich bar and beverages. Cosy atmosphere or outside on the patio, weather permitting. Tel. 228-3651.

Arts 200. Convenient service for quick pick up of beverages, baked goods, sandwiches, etc. Located in the Buchanan Lounge. Tel. 228-2002.

Edibles. Friendly, intimate and warm atmosphere to meet colleagues and friends for coffee break, lunch or early supper. Located in the lower level of the Scarfe Building (corner of Main Mall and University Boulevard). Tel. 228-6258.

The Ponderosa. Meet your friends by the Big Ponderosa Pine located on the corner of West Mall and University Boulevard for breakfast and daily specials, custom and ready made sandwiches, snacks, short orders, custom salad bar and char-broiled burgers. Beer, Cider and Wine available. Tel. 228-2469.

The Bakeshop. Order a decorated cake or a giant personalized cookie for that special occasion from the Bakeshop. Located in the lower Ponderosa, facing Lower Mall. Open Monday to Friday 8:00 a.m. to 2:00 p.m. or call 228-5717.

Catering (228-2018). Call us for your campus catering needs! Coffee breaks, luncheons, banquets, teas, receptions, weddings, wine and cheese parties. Pick up service also available for meat, cheese, pastry and sandwich platters and all types of salads. Located in the SUBWay Cafeteria, Room 115. Open Monday to Friday 9:00 a.m. to 4:00 p.m.

PUBLICATIONS

The University of British Columbia Press

Director, James J. Anderson, M.A. (Brit. Col.)

The University of British Columbia Press is an academic publishing house based on the same principles that were employed to establish the still flourishing learned presses in Oxford and Cambridge in the fifteenth and sixteenth centuries. Its aim is to contribute to the dissemination and preservation of learning, education, and culture. To that end, it publishes books written not only by UBC faculty but also by authors in other B.C. universities and in other parts of Canada and the world.

Recently published books include: *Two Political Worlds: Parties and Voting in British Columbia* by Donald Blake; *The Challenge of Child Welfare*, edited by Ken Levitt and Brian Wharf; *Paradoxes of Rationality and Cooperation: Prisoner's Dilemma and Newcomb's Problem* edited by Richmond Campbell and Lanning Sowden: *The Chinese Connection: Getting Plugged in to Pacific Rim Real Estate Trade and Capital Markets* by Michael Goldberg; *The Resistance to Church Union in Canada* by Keith Clifford; *Robertson Davies, Playwright: A Search for the Self on the Canadian Stage*, by Susan Stone-Blackburn; *The Psychological and Medical Effects of Concentration Camps and Related Persecutions on Survivors of the Holocaust:* A Research Bibliography by Leo Eitinger and Robert Krell.

The offices of The University of British Columbia Press are located in the Old Auditorium on Campus. They house the Presses' editorial, marketing, production and book ordering facilities. Shipping and warehousing are located in the basement of the former UBC bookstore at 6320 Agricultural Road.

Information and catalogues of recently published books and of all books in print are available from:

The University of British Columbia Press, 303 - 6344 Memorial Road, Vancouver, B.C., Canada. V6T 1W5. Tel. (604) 228-3259 or 228-5959.

Pacific Affairs

Edited by R. Stephen Milne

This scholarly international quarterly covers the political, economic, social and diplomatic problems of Asia and the Pacific. Each issue contains several research articles and a comprehensive book review section.

Canadian Literature

A Quarterly of Criticism and Review, edited by William H. New

This journal serves as a continuing symposium on the nation's literature and on literature in its relation to society. The journal also contains reviews of all significant Canadian literary works.

B.C. Studies

Edited by Allan Smith

B.C. Studies publishes the results of research pertaining to the province. Articles covering a wide range of interests such as economics, history, sociology, geography, politics and resource management are included. Each issue also contains reviews of books about the province and a bibliography of recently published material, both government and private, related to B.C. Published quarterly.

The Canadian Yearbook of International Law

Edited by C. B. Bourne

The *Yearbook* presents contemporary thought and practice in the field of international law. Each edition investigates some recent legal and policy changes of states and of international organizations. Particular topics and their legal status are also discussed. Sections dealing with Canadian practice in international law as reflected in public statements and correspondence, treaties, and judicial decisions are included each year.

The Yearbook, published since 1963, is issued under the auspices of the Canadian Branch of the International Law Association. It is distributed by the University of British Columbia Press.

PRISM International

Steve Noyes, Editor-in-Chief:
George McWhirter, Advisory Editor.

PRISM *International* is a literary journal published by the department of Creative Writing, featuring original work in English and translation from a wide variety of languages. 1984 marked PRISM's 25th anniversary, making it Western Canada's oldest literary magazine. Since 1978 editorial staff has been drawn from the graduate students of the Department of Creative Writing. Quarterly; individual subscription rates: 1 year $10.00, 2 years $14.

Studies in Medieval and Renaissance History

Editors; J. A. S. Evans and R. W. Unger

UBC's Committee for Medieval Studies has revived the series: *Studies in Medieval and Renaissance History* formerly published by the University of Nebraska Press. Volumes I (1978), II (1979), III (1980), IV (1981), V (1982) and VI (1983) of the new series have been published. Volume VII and succeeding volumes published by A M S Press, New York.

MUSEUMS

These consist of (1) the Museum of Anthropology located at 6393 N.W. Marine Drive; (2) the M. Y. Williams Geological Museum; located on the first floor of the Geological Sciences Centre; (3) the Zoological Museum, housed in various rooms of the Biological Sciences Building; (4) the Herbarium which comprises bryophyte, lichens, mycological, phycological and vascular plant collections, and is housed in the Biological Sciences Building.

Museum of Anthropology

Michael M. Ames, B.A. (Brit. Col.), Ph.D. (Harvard), F.R.S.C., Director.
Marjorie M. Halpin, M.A. (George Washington), Ph.D. (Brit. Col.), Curator of Ethnology.
Audrey Hawthorn, M.A. (Columbia), Curator of Ethnology. (On leave)
Madeline Bronsdon Rowan, M.A. (Brit. Col.), Curator of Education/Ethnology.
Margaret Stott, M.A. (McGill), Ph.D. (London School of Economics), Curator of Ethnology/Education.
R. G. Matson, B.A. (Calif., Riverside), Ph.D. (Calif., Davis), Associate Professor, Curator of Archaeology.
Miriam Clavir, B.A. (Toronto), M.A. (Queen's), Honorary Lecturer.

The **Museum of Anthropology** was founded in 1948 and now contains about 80,000 archaeological artifacts, an extensive textile collection and 25,000 catalogued items. Of these, the North West Coast Collection is outstanding, consisting of a complete ethnographic range of tribal materials, both ceremonial and domestic. Purchased with grants made by Dr. H. R. MacMillan, Dr. Walter C. Koerner and the Leon and Thea Koerner Foundation, the North West Coast group includes for the most part materials brought in by Indian families, and also, the very extensive collections made by early missionaries: Dr. G. H. Raley, The Rev. W. E. Collison, Dr. G. E. Darby and others.

The Oriental Collections are extensive and include gifts made by the Fyfe-Smith family and items purchased by them to extend the range of materials to illustrate the history of Japanese and Chinese Art. Also included are gifts from the late Mr. and Mrs. B. E. Clegg, and the Japanese Association of Prefectural Governments.

Classical materials of Greece, Cyprus, and Rhodes are mainly from the gift of Mrs. Sid Leary and the Baroness Van Haersolte.

Artifacts, gathered before 1914, from the domestic and ceremonial life of the Oceanic cultures, were the gift of Mr. Frank Burnett.

Recent acquisitions from India, S.E. Asia, and West Africa, represent the arts of these regions.

Collections from North American Indian cultures are reasonably extensive and the Eskimo material from the Coppermine River area, collected by Michell Pierce in 1930, is excellent.

These collections are used in teaching, especially in museum training courses, and in various anthropology courses. They are also resources for research work by qualified students.

The Museum of Anthropology moved to new premises on May 30, 1976. The building was part of a Centennial gift from the Federal Government to the people of British Columbia to allow the University to "share the collections of the U.B.C. Museum of Anthropology with the public" and "house the additional gift of the Indian art collection of Walter and Marianne Koerner of Vancouver."

The operations of the Museum are funded in part by the National Museums of Canada, and by the Province of B.C. Lottery Fund.

The M. Y. Williams Geological Museum

J. J. Nagel, B.Sc. (Calif.), M.Sc. (Brit. Col.), Curator.

Located on the first floor of the Geological Sciences Centre, the museum includes displays of spectacular rocks, minerals and fossils. This exhibit is the only one of its kind in British Columbia, and displays are changed periodically.

The most prominent display is the wall-mounted example of the dinosaur *Lambeosaurus*. This animal, 80 million years old, occupies a permanent position just

inside the door. Collected in southwestern Alberta in 1913, this dinosaur illustrates a number of features peculiar to the hadrosaurs or hooded dinosaurs. These were common in some parts of Canada during the Upper Cretaceous Period.

Minerals, rocks and fossils are drawn from departmental collections which total approximately 40,000 items. Geological specimens are unusual in that they have aesthetic appeal over and above their scientific interest. It is this fact which makes the displays especially interesting to the layperson.

The museum is open to the public Monday through Friday, 9:00 to 5:00. Group programs can be arranged with the curator. A "Friends of the Museum" group meets a number of times each year. For those with an interest in geology, further details can be obtained from the curator at 228-5586.

Herbarium

A. D. M. Glass, B.Sc. (Wales), Dip.Ed. Wales, Ph.D. (Brit. Col.), Director of the Herbarium.
R. J. Bandoni, B.S. (Nevada), M.S., Ph.D. (Iowa), Curator of the Mycological Collections.
J. R. Maze, B.A. (Humboldt), M.S. (Washington), Ph.D. (California), Curator of the Vascular Plant Collections.
R. F. Scagel, M.A. (Brit. Col.), Ph.D. (Calif.), F.R.S.C., F.L.S., Curator of the Phycological Collections.
W. B. Schofield, B.A. (Acadia), M.A. (Stanford), Ph.D. (Duke), Curator of the Bryophyte Collections.
G. F. Otto, Honorary Curator of Lichen Collections.

The **Herbarium** consists of permanent reference and research collections of dried plant specimens housed in cases in the Biological Sciences Building. All groups from the algae to the flowering plants are represented.

The total number of flowering plants and ferns is over 186,000 sheets. An effort is being made to preserve in this collection all species known to occur in the province. Its value in this regard has been greatly augmented through the donation by the late J. W. Eastham of several thousand B.C. specimens. In addition it contains a number of smaller collections by other botanists working in the province as well as considerable material from other parts of North America, and from Europe, South Africa, South America, the Hawaiian Islands, New Zealand and Australia.

The Phycological Collections comprise over 67,000 specimens of marine algae. They are rich in species from British Columbia, Washington, Oregon and Alaska. Collections were made in research projects supported in part by grants from the Natural Science and Engineering Research Council and the Defence Research Board to the Department of Oceanography and the Department of Botany.

The Mycological Collections comprise over 12,000 specimens of fungi. This includes an excellent collection of Myxomycetes as well as representatives of most groups of true fungi.

The Bryophyte Collections contain the largest and most complete collection of British Columbia bryophytes in existence. It is well represented by material from other Canadian Provinces, Japan, U.S.A., Latin America, Western Europe, Australia and New Zealand. The collection has been built as a direct result of sponsorship by the National Science and Engineering Research Council. The collections of bryophytes contain over 175,000 specimens, of which over 145,000 are mosses and 30,000 are hepatics, and the lichen collections contain over 21,000 specimens.

The collections are available for study to students and research institutions.

Zoological Museum

G. G. E. Scudder, B.Sc. (Wales), D.Phil. (Oxon), F.R.E.S., F.E.S.C., F.R.S.C., Curator of the Spencer Entomological Museum.
J. N. M. Smith, B.Sc. (Edinburgh), D.Phil. (Oxon), Curator of the Cowan Vertebrate Museum.
N. J. Wilimovsky, B.S., M.A. (Mich.), Ph.D. (Stanford), Curator of Ichthyological Museum.

The **Zoological Museum** contains material representative of both vertebrate and invertebrate taxa. It is housed in several rooms in the Biological Sciences building.

The Cowan Vertebrate Museum contains 13,490 specimens of mammals, 14,300 birds, 6650 bird eggs, and 1311 amphibians and reptiles. Major accessions include the K. Racey collection of birds and mammals, the H. R. Macmillan bird collection, and the zoological collections of W. S. Maguire and J. Wynne. Major geographical representation is British Columbia.

The George J. Spencer Entomological Museum now contains about 400,000 specimens. Notable holdings include the Stace-Smith Collection of Coleoptera, the Foxlee collection of Diptera and Hymenoptera, the Downes collection of Hemiptera, and the Llewellyn-Jones collection of Lepidoptera.

The Ichthyological Museum has one of the two largest collections of fish in Canada with over 23,000 catalogued entries comprising over 800,000 specimens. Fifty percent of the collection is from North America and the remainder from throughout the world. In addition to preserved specimens, the collection is rich in skeletal and x-ray material. The data base is amenable to computer manipulation, permitting searching for specific geographical areas and/or faunal associations.

The limnological collection contains a large number of plankton and bottom fauna samples from several hundred lakes in British Columbia.

NORTH EAST PACIFIC CULTURE COLLECTION OF MARINE PHYTOPLANKTON

F. J. R. Taylor, B.Sc.(Hons.), Ph.D. (Cape Town), Administrator.
J. C. Acreman, B.Sc.(Hons.) (MUN), Curator.

The North East Pacific Culture Collection (NEPCC) originated in the late 1960's in the Department of Oceanography under the administration and instigation of Dr. F. J. R. Taylor. It is housed in the Biological Sciences Building in Department of Oceanography space.

The NEPCC is registered with the World Federation for Culture Collections and receives partial financial support from the Natural Sciences and Engineering Research Council. It is, with respect to marine phytoplankton, the only one of its kind in Canada and is one of the most comprehensive in the world. Approximately 300 isolates (250 species) are currently in culture and all of the major algal groups appearing in the marine phytoplankton are represented. The major emphases are on local species of ecological and toxicological importance and those which may be of importance in biotechnology. Currently, 75% of the isolates are from B.C. waters and the remainder are from tropical and other temperate regions.

A unique feature of the NEPCC is the inclusion of various species of oceanic microflagellates isolated from the NE Pacific. The dinoflagellate collection with 93 isolates (55 species) is one of the largest in the world.

Cultures are supplied to courses at UBC and to researchers and commercial operations, worldwide. A nominal fee is charged to cover processing costs, unless an exchange of cultures can be arranged. Further information, including a current list of species in culture and relevant technical data, is available from the curator (228-4378; 228-5836).

BOTANICAL GARDEN

The history of the Botanical Garden at the University dates back to 1912 when two acres of land were set aside on the Provincial Colony Farm at Essondale. In 1916, the collections established at Essondale were moved about 20 miles to the present University site. Dr. John Davidson was appointed as the first Director of the Botanical Garden.

The present gardens consist of 50 acres on the western edge of the campus. Forty-four acres were set aside in 1966 west of the Thunderbird Sports Stadium as a new Botanical Garden area.

An older established area of the Botanical Garden is represented by Nitobe Memorial Garden. This Garden, which opened in June 1960, was dedicated to the memory of Dr. Inazo Nitobe, distinguished educator and international civil servant, who did much to interpret Japan to the West and the West to Japan. It was designed by Professor K. Mori of the University of Chiba and was developed to provide an authentic example of Japanese landscape architecture for the campus. Plants contained in the garden are of both Japanese and North American origin. The garden represents one of the finest examples of Japanese landscape architecture in North America.

New areas have been established, including a nursery in the south campus. An Alpine Garden, a B.C. Native Garden, a Contemporary, Arbor, Physick Garden, a Food Garden and an Asian Garden, in the Main Garden site near Thunderbird Stadium with the entrance at 6250 Stadium Road.

In April 1978, the 2.5 acre alpine garden was officially dedicated and named The E. H. Lohbrunner Alpine Garden in honour of Mr. Lohbrunner's continuing contribution to alpine plant horticulture in British Columbia. At the same time, the 8 acre B.C. Native Garden was dedicated to Professor John Davidson, first Botanical Garden Director and longtime member of the U.B.C. Faculty.

In May 1981 the specialized medicinal and pharmaceutical garden known as the Physick Garden was officially dedicated and, at the same time, the 30-acre Asian Garden was dedicated by Mr. Kenneth Wilson, former Supervisor of Operations for the Garden, who retired in 1980. The 30-acre Asian Garden contains the main Rhododendron species collection for the University as well as an outstanding collection of woody and herbaceous plant material of Asian origin.

The Botanical Garden serves as a repository for living plant collections used for teaching and research programs and is open to the public. A public horticultural information service is available by 'phoning 228-5858. An endowment membership program, The Davidson Club, was established in 1982 to provide public support for the Garden. Office is located at 6501 N.W. Marine Drive.

THE ASIAN CENTRE

The Asian Centre opened on the U.B.C. campus in 1981, built with funds donated by Asian business interests, largely Japanese, the provincial and federal governments of Canada, Canadian business and the general public. The Asian Centre houses the Asian Studies Library, the Institute of Asian Research, the Department of Asian Studies, and provides space for the Asian interests of the Departments of Music, Fine Arts and Theatre.

The Asian Centre has an auditorium seating up to 220 people, exhibition galleries, and a music performance studio with seating capacity of 120. These facilities are intended to be made available to both university and public groups concerned with Asia. To book these areas call 228-4688. The building is open during the regular hours of the Asian Studies Library.

THE NORMAN MacKENZIE CENTRE FOR FINE ARTS

The Norman MacKenzie Centre for Fine Arts, named in honour of UBC's President from 1944 to 1962, is a tribute to his continuing interest in the arts throughout his career as one of Canada's leading educators. The Centre, dedicated in September, 1965, is comprised of the following buildings: the Frederic Lasserre Building, named for the founding director of the University's School of Architecture from 1946 to 1961, which provides facilities for faculty members and students in the Architecture School, the School of Community and Regional Planning and the Department of Fine Arts; the Music Building, which contains a variety of facilities for training students as instrumentalists, composers, singers and music teachers and a 289-seat recital hall for public performances; and the Frederic Wood Theatre, named for "Freddy" Wood, who taught at UBC from 1915 to 1950, which houses the University's Department of Theatre and includes two theatres, one seating 400 for major theatrical and musical productions and the Dorothy Somerset Studio, named for the founding head of the Theatre Department and a UBC faculty member from 1938 to 1965, which seats 80 persons.

THE UBC FINE ARTS GALLERY

Curator: Glenn Allison
Assistant: Mary Williams

The Fine Arts Gallery, located in the basement of the North Wing of the Main Library Building, was opened in December 1948. The gallery is a public facility contributing to the cultural life of the campus, the city, the province and beyond. Throughout the year the Fine Arts Gallery hosts a variety of informative and provocative exhibitions (approximately 7 per year) which confirm the creative and eclectic aspects of art. Exhibitions are formed or borrowed, drawing on work from both local and national artists, other Canadian art institutions, art organizations and international sources, in an attempt to expose the broadest possible spectrum of visual concerns to both the University community and the public at large.

Hours: Tuesday to Friday, 10 a.m.–5 p.m.
Saturday: 12 noon–5 p.m.
September–April.
Summer hours: to be announced.

RELATED ORGANIZATIONS AND AGENCIES

STUDENT ORGANIZATION

Alma Mater Society

Every student automatically becomes a member of the Alma Mater Society (A.M.S.) when enrolled in a credit course at the University. The A.M.S. supports all student activities. Its governing body is the Students' Council which is composed of representatives from the faculties and schools, the A.M.S. Executive, two of the student representatives to the Senate and the two student members of the Board of Governors. The A.M.S. Executive, Senate and Board of Governors representatives are elected by the general student body in January of each year.

The offices of the Alma Mater Society are located in the north west corner of the second floor in the Student Union Building.

Student Administrative Commission

The Student Administrative Commission (S.A.C.) is a constituent of the A.M.S. responsible for implementing and enforcing A.M.S. policies regarding the Student Union Building (SUB) and A.M.S. constituted clubs. It is also responsible for running student elections, S.U.B. Security and Clubs Days.

S.A.C. is comprised of a Director of Administration, a Secretary, and nine Commissioners who are appointed by Student Council Selections Committee in October and March.

Constituent Societies

Associated with each faculty or school there is a students' society, of which each student in that faculty or school is a member. These societies are responsible for organizing activities and programs in their respective constituencies. The societies are subsidiaries of the Alma Mater Society, and each elects member(s) to the Students' Council.

Student Union Building

The Student Union Building (SUB) was completed in the fall of 1968 and officially opened by Dean W. H. Gage in January 1969. SUB houses the offices of the Alma Mater Society and provides the necessary facilities for most student activities. Originally initiated by students in 1958 and extensively planned by them, SUB was financed jointly by the Alma Mater Society and the University Administration. Total cost of the project was approximately $5 million, the students' share being approximately 78 percent which was financed by a $15 per year levy paid by all students. Recently, students financed a $1.5 million expansion to the Student Union Building.

The original SUB contains 265 rooms of various sizes and uses. These range from a large ballroom to small conference rooms, to seminar rooms, to club areas (photography, studios, radio station, film facilities, dive shop, pottery and graphic studios, newspaper). Special facilities include recreation areas (bowling alley, billiards, pub, lounge), commercial areas (delicatessen, bank, college shop, travel service, copy service, ticket-centre, and credit union), cultural areas (art gallery and auditorium), meeting rooms and general open lounge space. These facilities can handle most student-sponsored activities. SUB also contains the largest university-run food service facility on campus. The SUB expansion contains additional club offices and meeting rooms, a new home for the Intramural Sports program, a restaurant, a snack bar, and a self-serve typing and word processing facility.

SUB is managed by the AMS Student Administrative Commission housed in the offices of the Alma Mater Society, second floor of the Student Union Building.

Publications

The Alma Mater Society publishes three times weekly the student newspaper "The Ubyssey". "Inside", an orientation publication and student handbook and a student calendar of events, are published by the A.M.S. and distributed during registration. In addition, several constituent societies publish newsletters and journals of interest to their respective members.

University Clubs

Clubs on campus are subsidiaries of the Alma Mater Society.

There are currently over 175 clubs on campus and information can be obtained from the A.M.S. Business Office, located on the second floor of SUB.

Fraternities and Sororities

Fraternities and sororities are recognized by the Senate of the University as student organizations. Sororities are governed by the Women's Panhellenic Association. Membership in sororities and fraternities is by invitation.

Summer Session Association

The Summer Session Association serves as a student council for Summer Session students. A variety of activities are sponsored and these change from year to year as student population varies and as new needs are perceived.

All SSA activities will be advertised on special bulletin tripods in all major campus buildings.

ALUMNI ASSOCIATION OF THE UNIVERSITY OF BRITISH COLUMBIA

Board of Management: 1985–86

Executive Committee

President: Elbert Reid, B.A.Sc. '51.
Vice-President: William B. McNulty, B.P.E. '68, M.P.E. '70.
Past President: Kyle R. Mitchell, B.Com. '65, LL.B. '66.
Treasurer: Kevin Rush, B.Sc. '80 M.B.A. '81.
Chair, Alumni Fund: Lyle Stevenson B.A.Sc. '72, M.Sc. '75
Chair, Communications/Editorial: Peter Jones, B.A. '69.
Chair, Volunteer Development: R. Ann McAfee, B.A. '62, M.A. '67, Ph.D. '75.
Executive Director, U.B.C. Alumni Association: Dan Spinner

Members-at-Large (1984–86)

Lynn Carmichael, B.Ed. '72 M.Ed. '84.
Mark Hilton, B.Com. '83.
George Mapson, B.P.E. '73, M.Ed. '79.
Ann McAfee, B.A. '62, M.A. '67, Ph.D. '75.
Brent Tynan, B.Com. '82, LL.B. '83.
Oscar Sziklai (B.S.F. Sopron, Hungary), M.F. '61, Ph.D. '64.

Members-at-Large (1985–87)

Robert Affleck, B.A.Sc. '55.
Linda May Angus, B.A. '73
Jim Cooney, M.L.S. '76
Sandy James, M.A. '83
Bill Richardson, B.A.Sc. '83
Alfred Scow, LL.B. '61.

Divisions Chair: John Lee, B.A.Sc. '83
Branches Chair: Robert Affleck, B.A.Sc. '55
Heritage Chair: Blythe Eagles, B.A. '22, D.Sc. '68
Campus Activities Chair: Mark Hilton, B.Com. '83

1986-87

Alma Mater Society Representative
Simon Seshadri, President.

Faculty Association Representative
David Haley, M.F., Ph.D.

The U.B.C. Alumni Association subscribes to the concept that a university is an institution with which members enjoy a lifelong relationship beginning with their student years.

The role of the association is to facilitate the relationship of graduates with their university and to support the university in its pursuit of excellence.

Membership is open to all graduates of the University and is automatic upon graduation.

The Association is governed by a Board of Management elected each year. The Association offices are in Cecil Green Park, 6251 Cecil Green Park Road, Vancouver, B.C., V6T 1W5. Telephone 228-3313.

There are now over 100,000 U.B.C. graduates around the world. The Association produces and distributes its magazine, the *Chronicle*, to all graduates with known addresses. An address file is maintained on all alumni. This forms part of the rolls of Convocation from which the Chancellor and Convocation members of Senate are elected every three years.

Financial contributions by alumni and other friends of the University to the Alumni Fund make possible the awarding of over 300 scholarships and bursaries through the N.A.M. MacKenzie Scholarships, the Walter H. Gage Bursary Fund, the John B. Macdonald Bursary Fund and a number of individual scholarships. The Association is also one of the trustees of the Walter Gage Memorial Fund which provides aid to individual students and to campus projects.

The Alumni Fund also provides financial aid to libraries, athletics, the President's Alumni Fund, and a variety of special student and faculty-initiated projects which cannot be covered by the University's budget.

The Association sponsors a wide range of activities on a year-round basis, such as reunions, a speakers bureau for community organizations, alumni meetings in Canadian and foreign centres, programs for graduates of several degree divisions. In addition, the Association conducts research and prepares reports on many aspects of University affairs and maintains contact for discussion of university problems with members of the Provincial government.

For further information contact the Executive Director, at Cecil Green Park, 228-3313.

INTERNATIONAL HOUSE

Honorary Founding Life Members
Norman A. M. MacKenzie, C.M.G., M.M. and Bar, Q.C., President Emeritus.
Thomas H. Flinn, Paul Harris Fellow of International Rotary, Vancouver South Rotary Club.
Herrick B. Young, President, Near East Foundation, New York.

The University of British Columbia
D. W. Strangway, M.A., Ph.D., F.R.A.S., F.R.S.C., President.
Neil Risebrough, M.A.Sc., Ph.D., Associate Vice-President; Student Services.

Chairman of the Board of Directors
Malcolm Smith, Ph.D., Faculty of Law, U.B.C.

Executive Director
R. A. McBlane, B.Ed., M.Ed.

The Rotary Club of Vancouver Representative
Brice McDougall.

Vancouver South International Rotary Club Representative.
Harvey White.

International House is a centre for both international and Canadian students as well as faculty and members of the community. The house provides pre-arrival and arrival information and continuing support throughout the students' stay. Services for international students include reception, arranging of temporary accommodation, an initial orientation program, liaison with and referral to campus, government and community agencies and departments, and support and advice on all matters of concern to international students. Other services include a Work and Study Abroad Information Library which contains information on overseas work and study opportunities.

B.C. RESEARCH

B.C. Research, the technical arm of the British Columbia Research Council, is an independent, non-profit, industrial institute, located at 3650 Wesbrook Mall, south of 16th Avenue on The University of British Columbia Campus. B.C. Research offers services in the fields of biology, chemistry, engineering, physics, management sciences, extractive metallurgy, industrial health and related disciplines.

The function of B.C. Research is to solve practical industrial problems for clients in both the private and public sectors by performing contract research on a confidential, non-profit basis. It cooperates with the National Research Council in providing free technical information and industrial engineering services.

B.C. Research has a total staff of 111, of which 40 are professional scientists, engineers, and economists.

Close cooperation is maintained with the science, engineering and other related departments of the University.

Students undertaking graduate studies may be able to carry out their research in association with B.C. Research. The thesis topics for such students will be in areas of interest common to the university and to B.C. Research and this arrangement is likely to be of most interest to students planning a career in industrial research or development. Normal procedures will apply for acceptance of students and evaluation of the thesis.

PULP AND PAPER RESEARCH INSTITUTE OF CANADA

The Pulp and Paper Research Institute of Canada is a non-profit research and educational organization dedicated to enhancing the scientific and technical strength of Canada's pulp and paper industry. The funding of the Institute is borne largely by maintaining member companies which represent nearly all of the pulp and paper producers in Canada. Fundamental and applied research is carried out in laboratories in Pointe Claire and Montreal, Quebec and in Vancouver, B.C., with a total staff of nearly 300. The Institute also supports programs of post-graduate studies at McGill University and The University of British Columbia, assisting student research for advanced degrees under the supervision of staff members located at these universities. The current program at UBC is in the Department of Chemical Engineering and the Department of Electrical Engineering.

UNIVERSITY RELIGIOUS COUNCIL

The Council is a President's Committee whose functions are to co-ordinate and supplement activities of religious organizations on the campus, to provide opportunities for liaison among the University, the Chaplains, and the student religious clubs, and to act as a forum for the discussion of problems of religious organizations on the campus. Its membership includes all the Chaplains, religious advisers to student clubs, representatives of the teaching Theological Colleges on the campus, representatives from each of the student religious clubs, and a number of members of faculty appointed by the President. The clubs represented in the Council arrange studies of various aspects of religion under their own auspices, and from time to time the Council, either itself, or in conjunction with one of the clubs, sponsors meetings of wider interest.

The attention of interested students is also drawn to the courses offered in Religious Studies (see the Faculty of Arts section of the calendar). From time to time courses are offered on a non-credit basis by the Centre for Continuing Education. Certain courses of similar interest may also be taken in the Departments of Anthropology and Sociology, English and Philosophy.

Students are invited to consult the following Chaplains and advisers, whose services are offered on a voluntary basis: Bill Gooding, B.P.E., Dip.C.F., M.Div., (Baptist), Rev. Ray Schultz, B.A. M.Div.(Lutheran), Mr. Robert Powell, B.Sc., M.Div. (Pentecostal Assemblies of Canada), Rev. Bruno Tesolin, B.A., M.Div. (Roman Catholic), Rabbi Dan Siegel (Jewish). A representative of the Anglican-United Church Campus Ministry will be appointed.

AFFILIATED THEOLOGICAL COLLEGES

STATUTE OF THE SENATE
of
THE UNIVERSITY OF BRITISH COLUMBIA
AFFILIATION OF THEOLOGICAL COLLEGES
January 18, 1978

The Senate of The University of British Columbia, under the powers conferred by the *Universities Act*, 1974, enacts as follows:

(a) Any incorporated theological college in this province desiring affiliation with The University of British Columbia shall make application therefor to the Secretary of the Senate and the Secretary of the Board of Governors of the University and shall furnish with its application a copy of its calendar.

(b) No such college shall be admitted to affiliation unless by a two-thirds vote of the members of Senate present at a regular meeting thereof, and also by a two-thirds vote of the governors present at a meeting of the Board of Governors. Nor shall the question of such admission be put to vote at such meeting of the Senate until after opportunity has been given to the several Faculties to make such representation as they may see fit; nor yet, unless by unanimous consent of the members of Senate present at such meeting until the expiration of three months' notice.

(c) Any affiliated theological college may at any time, by duly notifying the Senate to that effect, withdraw from affiliation with the University provided that one year's notice of withdrawal has been given.

(d) The Senate may also at any time, by the like vote and under the like restrictions as are above prescribed for the admission of a college to affiliation, terminate the affiliation of any theological college with the University provided that a one year notice of withdrawal of the affiliation has been given by the University.

(e) An affiliated college must agree, as a condition of affiliation, to provide the following statement in all of its publications that indicate affiliation with the University including students' transcripts of records:

> "The granting of affiliation means that the college meets the criteria for affiliation established by the Senate of The University of British Columbia but does not imply any scrutiny or approval of the course offerings of the affiliate by the University Senate."

(f) The *criteria* for affiliation of theological colleges are as follows:

(i) A college shall be incorporated in the Province of British Columbia with power to confer and grant degrees in theology.

(ii) A college shall be, and shall remain in good standing with a recognized religious community or with other theological colleges affiliated with The University of British Columbia, or both.
(iii) A college shall have a physical presence on, or juxtaposed to, the campus of the University.
(iv) A college shall appoint to its regular teaching staff only people who have the equivalent standard of training normally required in university work, preferably an advanced degree in theology or a related discipline.
(v) A college must maintain an academic program, either
  (a) leading to a degree, in which case it shall maintain at least four full-time properly qualified faculty in residence, or
  (b) not leading to a degree, in which case it shall maintain at least two full-time properly qualified faculty in residence.
(vi) A college shall normally require university graduation as a prerequisite for admission to its academic programs leading to a degree. Though a college would have the right to admit to its degree programs some students without previous university training, these should not ordinarily constitute more than one-fifth of the total number of students registered in such programs. University matriculation should be required as a minimum.
(vii) A college offering courses in theology shall do so at an academic standard acceptable to the appropriate recognized theological accrediting agency associated with the religious community of that college.
(viii) A college shall maintain, or otherwise supply, library resources adequate to the academic programs which it offers. These resources shall be made available to the university community.
(ix) A college shall have a sufficient degree of separateness and independence from any other institution:
  (a) to identify its assets and expenditures
  (b) to mark its specific functions as a theological college, and
  (c) to give it a governing body of its own.
(x) A college shall submit a resume of its academic operations to the Secretary of Senate annually and shall be prepared to respond to a request from the Senate from time to time for a review of its conformity to the criteria for affiliation.
(xi) A college shall allow the Senate of the University to have a representative on the academic planning body of the college.

Vancouver School of Theology

A graduate ecumenical School of Theology incorporated by the B.C. Legislature in 1971. The School continues the former Anglican Theological College of British Columbia and the former Union College of British Columbia and is open to participation by other denominations. The school has formal affiliation with the University, and is fully accredited by the Association of Theological Schools in the United States and Canada.

Principal
THE REV. ARTHUR VAN SETERS, B.A., B.D., Th.M., Th.D.
Registrar
JUNE BRADLEY, B.A.

The Vancouver School of Theology offers programs for lay men and women and provides graduate degrees in training for the ministry and priesthood. It seeks to be a centre for theological research and dialogue.

A Graduate Summer Session is held each year, concurrent with the Summer Session of the University.

Enquiries should be addressed to: The Registrar, Vancouver School of Theology, 6000 Iona Drive, Vancouver, B.C., V6T 1L4.

St. Mark's College
(Roman Catholic)

Principal
REV. PAUL C. BURNS, C.S.B., B.A., S.T.B., M.A., B.Litt,. Ph.D.
Registrar
SISTER KATHLEEN CROWLEY, S.C., B.Ed.

St. Mark's College, an affiliated College of the University, offers a limited number of courses in Theology at several levels. It also provides a theological library open to all members of the University, and facilities for worship and pastoral care.

Regent College

Principal
CARL E. ARMERDING, A.B., B.D., M.A., Ph.D.

The College is an autonomous body, trans-denominational in character and evangelical and Biblical in basis. Regent College offers Biblical and Interdisciplinary courses of instruction for lay men and women that lead to a one-year Diploma in Christian Studies, and a two-year Master of Christian Studies or Master of Theological Studies degree. A three-year Master of Divinity degree designed for men and women entering professional ministries is also offered and a fourth post-Master of Divinity year leading to a Master of Theology degree. Summer Sessions consisting of two three-week periods and a six-week intensive Hebrew and Greek-Language Session are held each year. The College has formal affiliation with the University.

Enquiries should be addressed to The Registrar, Regent College, 2130 Wesbrook Mall, Vancouver, B.C., Canada V6T 1W6.

RESIDENTIAL THEOLOGICAL COLLEGES

St. Andrew's Hall
(The Presbyterian Church in Canada)

Dean of Residence
REV. BRIAN J. FRASER, M.A., M.Div., Ph.D.

This men's residence provides on-campus dormitory, dining-room and chapel facilities for forty-three students during winter sessions. Rooms are available May 1 to August 31. Application forms should be requested and filed well in advance.

Carey Hall
(Baptist Federation of Canada)

Principal
PHILIP COLLINS, B.Th., B.D. , M.Div., Ordained Minister.

Faculty Members
SAMUEL J. MIKOLASKI, B.A., M.A., B.D., D.Phil.,
Pioneer McDonald Professor of Baptist Studies

As a residential college, Carey Hall provides residence and dining facilities for 40 co-educational undergraduate students, mostly in single rooms. Carey Hall is also the centre for pastoral studies and graduate internship programs for the Baptist Union of Western Canada offering courses in applied theology, supervised field education, and continuing education programs for church leaders; working in co-operation with Regent College in terms of the M.Div.

ENROLMENT 1985–86
(as at November 1, 1985)

	Regular Session		*Extrasessional Credit Courses*		*Total*
	M	*F*	*M*	*F*	
FACULTY OF AGRICULTURAL SCIENCES					
First Year	14	42	—	—	56
Second Year	53	58	—	1	112
Third Year	38	36	—	1	75
Fourth Year	29	54	—	—	83
Total	134	190	—	2	326
Landscape Architecture					
First year	10	10	—	—	20
Second year	13	8	—	—	21
Third Year	5	5	—	—	10
Fourth Year	6	5	—	—	11
Total	34	28	—	—	62
TOTAL IN FACULTY	168	218	—	2	388
FACULTY OF APPLIED SCIENCE					
Engineering					
First Year	345	57	—	—	402
Second Year	424	57	—	—	481
Third Year	411	51	—	—	462
Fourth Year	415	44	1	—	460
Total	1,595	209	1	—	1,846
School of Architecture					
First Year	22	16	—	—	38
Second Year	31	15	—	—	46
Third Year	35	21	—	—	56
Total	88	52	—	—	140
School of Nursing					
First Year	5	76	—	—	81
Second Year	6	79	—	—	85
Third Year	5	171	—	—	176
Fourth Year	3	125	—	2	130
Total	19	451	—	2	472
TOTAL IN FACULTY	1,702	712	1	2	2,417

1980-81

	Regular Session M	Regular Session F	Extrasessional Credit Courses M	Extrasessional Credit Courses F	Total
FACULTY OF ARTS					
Arts					
First Year	624	1,050	20	56	1,750
Second Year	698	904	16	53	1,671
Third Year	670	954	18	32	1,674
Fourth Year	559	693	6	35	1,293
Total	2,551	3,601	60	176	6,388
Fine Arts					
Second Year	9	17	—	1	27
Third Year	13	33	—	—	46
Fourth Year	23	24	—	1	48
Total	45	74	—	2	121
Music					
First Year	21	27	—	—	48
Second Year	15	33	1	1	50
Third Year	32	34	—	—	66
Fourth Year	36	44	1	—	81
Total	104	138	2	1	245
School of Family and Nutritional Sciences					
First Year	—	36	—	—	36
Second Year	3	70	—	1	74
Third Year	—	56	—	—	56
Fourth Year	—	65	—	—	65
Total	3	227	—	1	231
School of Library, Archival and Information Studies					
Library Science					
First Year	9	38	—	—	47
Second Year	10	34	—	2	46
Total	19	72	—	2	93
Archival Studies					
First Year	1	6	—	—	7
Second Year	7	11	—	—	18
Total	8	17	—	—	25
School of Social Work					
Third Year	8	24	—	—	32
Fourth Year	4	25	—	—	29
Fifth Year	26	41	—	—	67
Total	38	90	—	—	128
Diploma Programs					
Art History	7	12	—	—	19
Applied Linguistics	1	4	—	—	5
Film/T.V.	3	3	—	—	6
French Translation	3	11	—	—	14
German Translation	—	1	—	—	1
Total	14	31	—	—	45
TOTAL IN FACULTY	2,782	4,250	62	182	7,276
FACULTY OF COMMERCE AND BUSINESS ADMINISTRATION					
First Year	199	160	—	1	360
Second Year	218	176	—	—	394
Third Year	271	145	—	—	416
Fourth Year	256	160	—	1	417
Total	944	641	—	2	1,587
Licentiate in Accounting					
Second Year	3	1	—	—	52
Total	3	1	—	—	52
TOTAL IN FACULTY	947	642	—	2	1,591
FACULTY OF DENTISTRY					
Dentistry					
First Year	32	8	—	—	40
Second Year	27	13	—	—	40
Third Year	29	11	—	—	40
Fourth Year	23	12	—	—	35
Total	111	44	—	—	155
Post Graduate Specialty Training	4	1	—	—	5
Dental Hygiene					
First Year	1	19	—	—	20
Second Year	—	21	—	—	21
Total	1	40	—	—	41
TOTAL IN FACULTY	116	85	—	—	201
FACULTY OF EDUCATION					
Elementary Division					
Second Year	16	128	1	5	150
Third Year	37	249	—	12	298
Fourth Year	40	324	1	20	385
Graduates	60	175	2	13	250
Total	153	876	4	50	1,083
Elementary Education (NITEP)					
First Year	12	20	—	—	32
Second Year	7	34	—	—	41
Third Year	7	23	—	—	30
Fourth Year	4	16	—	—	20
Total	30	93	—	—	123
Secondary Division					
Second Year	34	43	5	1	83
Third Year	46	40	4	—	90
Fourth Year	37	36	3	—	76
Fifth Year	51	32	2	2	87
Graduates	83	54	1	2	140
Industrial Education	37	—	1	—	38
Total	288	205	16	5	514
Special Education					
Third Year	—	17	—	—	17
Fourth Year	2	13	—	—	15
Fifth Year	2	17	—	—	19
Total	4	47	—	—	51
Diploma Programs	27	85	2	4	118
Certification	60	191	12	42	305

1986-87

	Regular Session M	Regular Session F	Extrasessional Credit Courses M	Extrasessional Credit Courses F	Total
School of Physical Education and Recreation:					
Physical Education					
First Year	20	37	—	—	57
Second Year	43	35	—	—	78
Third Year	72	70	—	—	142
Fourth Year	74	83	—	—	157
Total	209	225	—	—	434
Recreation Education					
Second Year	3	8	—	—	11
Third Year	8	11	—	1	20
Fourth Year	14	24	—	1	39
Total	25	43	—	2	70
TOTAL IN FACULTY	796	1,765	34	103	2,698
FACULTY OF FORESTRY					
First Year	26	9	—	—	35
Second Year	51	1	—	—	52
Third Year	72	11	—	—	83
Fourth Year	93	18	—	—	111
TOTAL IN FACULTY	242	39	—	—	281
FACULTY OF GRADUATE STUDIES					
Ph.D.					
Agricultural Sciences	31	7	—	—	38
Applied Science	123	4	—	—	127
Arts	127	97	—	—	224
Commerce and Business Administration	49	17	—	—	66
Community and Regional Planning	5	1	—	—	6
Education	10	5	—	—	15
Forestry	27	11	—	—	38
Medicine	45	25	—	—	70
Music	8	2	—	—	10
Pharmaceutical Sciences	11	2	—	—	13
Science	333	75	—	—	408
Total	769	246	—	—	1,015
Ed.D.	39	74	—	—	113
D.M.A.	9	2	—	—	11
M.A.					
Arts	106	193	—	—	299
Community and Regional Planning	38	26	—	—	64
Education	101	191	—	—	292
Total	245	410	—	—	655
M.Sc.					
Agricultural Sciences	50	45	—	—	95
Audiology and Speech Sciences	1	27	—	—	28
Commerce and Business Administration	36	11	—	—	47
Community and Regional Planning	12	5	—	—	17
Dental Science	3	—	—	—	3
Family and Nutritional Sciences	—	5	—	—	5
Forestry	31	7	—	—	38
Medicine	46	52	—	—	98
Pharmaceutical Sciences	15	5	—	—	20
Science	221	111	—	—	332
Total	415	268	—	—	683
M.F.A.	31	29	—	—	60
M.H.Sc.	13	6	—	—	19
M.Mus.	6	10	—	—	16
M.A.Sc.	207	13	—	—	220
M.Arch	2	1	—	—	3
M.Eng.	57	3	—	—	60
M.S.N.	—	76	—	—	76
M.B.A.	243	83	—	—	326
M.F.	9	4	—	—	13
M.Ed.	142	303	—	—	445
M.P.E.	28	32	—	—	60
LL.M.	13	7	—	—	20
M.S.W.	17	44	—	—	61
TOTAL IN FACULTY	2,245	1,611	—	—	3,856
FACULTY OF LAW					
First Year	133	105	—	—	238
Second Year	122	95	—	—	217
Third Year	136	93	—	—	229
TOTAL IN FACULTY	391	293	—	—	684
FACULTY OF MEDICINE					
First Year	58	63	—	—	121
Second Year	85	45	—	—	130
Third Year	77	51	—	—	128
Fourth Year	73	50	—	—	123
Total	293	209	—	—	502
Medical Residents	255	109	—	—	364
Medical Laboratory Science					
Third Year	6	5	—	—	11
Fourth Year	3	1	—	—	4
Total	9	6	—	—	15
School of Rehabilitation Medicine					
Second Year	8	32	—	—	40
Third Year	6	29	—	—	35
Fourth Year	4	29	—	—	33
Total	18	90	—	—	108
TOTAL IN FACULTY	575	414	—	—	989
FACULTY OF PHARMACEUTICAL SCIENCES					
First Year	27	34	—	—	61
Second Year	68	74	—	—	142
Third Year	43	57	—	—	100
Fourth Year	36	65	—	—	101
TOTAL IN FACULTY	174	230	—	—	404
FACULTY OF SCIENCE					
First Year	853	441	—	2	1,296
Second Year	658	364	4	1	1,027
Third Year	520	266	—	—	786
Fourth Year	522	279	1	—	802
TOTAL IN FACULTY	2,553	1,350	5	3	3,911
Qualifying Year	22	24	—	1	47
Unclassified	380	491	87	172	1,119
Auditors	11	20	10	9	50
Senior Citizens	35	31	2	2	70
TOTAL WINTER SESSION	13,139	12,175	201	478	25,993
	25,314		679		

1986-87

	Regular Session		*Extrasessional Credit Courses*		
	M	*F*	*M*	*F*	*Total*
Guided Independent Study	—	—	461	855	1,316
Summer Session 1985	1,465	2,014	—	—	3,479
Spring Session 1985	—	—	1,632	1,961	3,593
GRAND TOTAL 1985–86	14,604	14,189	2,294	3,294	34,381

DEGREES CONFERRED
1985

Spring:
Ph.D.—63; Ed.D.—4; D.M.A.—1; M.A.Sc.—34; M.Arch.—1; M.A.—64; M.B.A.—126; M.Ed.—60; M.Eng.—20; M.F.A.—11; M.F.—2; LL.M.—4; M.Mus.—5; M.P.E.—5; M.Sc.—69; M.Sc.(Bus. Admin.)—4; M.S.N.—3; M.S.W.—8; B.A.Sc.—377; B.Arch.—42; B.A.—834; B.Com.—353; Lic. Acct.—35; D.M.D.—39; B.Ed.—310; B.F.A.—32; B.H.E.—39; LL.B.—218; M.D.—120; B.M.L.Sc.—7; B.Mus.—57; B.P.E.—77; B.R.E.—17; B.Sc.—508; B.Sc.(Agr.)—54; B.L.A.—17; B.S.F.—69; B.S.N.—130; B.Sc.(Pharm.)—63; B.S.R.—30; B.S.R.(O.T.)—3; B.S.R.(P.T.)—4; M.A.S.—3; M.L.S.—38; B.S.W.—42; Total—4,002

Fall:
Ph.D.—84; Ed.D.—4; D.M.A.—1; M.A.Sc.—44; M.A.—117; M.B.A.—25; M.Sc. (Bus. Admin.)—12; M.Ed.—104; M.Eng.—11; M.F.A.—11; M.F.—2; M.H.Sc.—4; LL.M.—4; M.Mus.—3; M.P.E.—10; M.Sc.—138; M.S.N.—12; M.S.W.—37; M.A.S.—4; M.L.S.—6; B.A.—182; B.A.Sc.—50; B.Arch.—3; B.Com.—20; Lic. Acct.—3; B.Ed.—95; B.F.A.—2; B.H.E.—1; LL.B.—1; B.Mus.—7; B.P.E.—9; B.R.E.—4; B.Sc.—65; B.Sc. (Agr.)—6; B.S.F.—12; B.Sc. (Forestry)—1; B.S.N.—10; B.Sc. (Pharm.)—2; B.S.R. (P.T.)—1; B.S.W.—23; Total—1,130

DIPLOMAS GRANTED

	1985	
	Spring	**Fall**
Adult Education	33	8
Applied Linguistics	2	1
Art History	3	1
Counselling	2	3
Dental Hygiene	19	—
Education of the Deaf	15	—
Education of Visually Impaired Children	11	—
English Education	2	2
Film and TV Studies	1	—
French Translation	2	2
German Translation	2	1
Periodontics	—	1
Total	92	19

1986-87

THE FACULTY OF AGRICULTURAL SCIENCES

ACADEMIC STAFF

J. F. RICHARDS, M.Sc. (Manit.), Ph.D. (Minn.), P.Ag., Professor of Food Science and Dean of the Faculty.
L. E. LOWE, M.A. (Oxon), M.Sc., Ph.D. (McGill), Professor of Soil Science and Associate Dean of the Faculty

Department of Agricultural Economics
J. D. GRAHAM, M.Sc. (Natal), Ph.D. (Purdue), Associate Professor and Head.
T. J. HAZLEDINE, B.A. (Canterbury), M.A. (Otago), Ph.D. (Warwick), Associate Professor.
R. R. BARICHELLO, B.Sc. (Agr.) (Brit. Col.), A.M., Ph.D. (Chicago), Assistant Professor.
G. KENNEDY, B.A. (Brit. Col.), M.Sc. (Minn.), Ph.D. (Purdue), Assistant Professor.
C. C. SHORT, M.Sc. (Brit. Col.), Ph.D. (Iowa State), Assistant Professor.
G. R. BANTA, Ph.D. (Alta.), Adjunct Professor.
STEPHEN CHARLES THOMPSON, Ph.D. (Reading), Adjunct Professor.

Lecturers from Other Departments
WILLIAM S. GRIFFITH, Professor, (Administrative, Adult and Higher Education).
THOMAS J. SORK, Assistant Professor, (Administrative, Adult and Higher Education).

Department of Animal Science
R. BLAIR, B.Sc. (Glasgow), Ph.D. (Aberdeen), D.Sc. (Sask.), P.Ag., Professor and Head.
C. R. KRISHNAMURTI, M.V.Sc. (Madras), Ph.D. (Alta.), P.Ag., Professor.
BERYL E. MARCH, B.A., M.S.A. (Brit. Col.), F.A.I.C., F.R.S.C., F.P.S.A., P.Ag., Professor (part-time).
B. D. OWEN, M.Sc. (Alta.), Ph.D. (Sask.), P.Ag., Professor.
R. M. BEAMES, M.Agr.Sc. (Queensland), Ph.D. (McGill), P.Ag., Associate Professor.
K. M. CHENG, B.S. (Tenn. Tech), M.S. (S. Illinois), Ph.D. (Minn.), Associate Professor.
R. C. FITZSIMMONS, B.S. (Washington State), M.S., Ph.D. (Minn.), Associate Professor.
R. G. PETERSON, B.S. (Wyoming), M.S., Ph.D. (Illinois), Associate Professor.
D. M. SHACKLETON, B.Sc. (Leicester), M.Sc. (Western), Ph.D. (Calgary), Associate Professor.
J. A. SHELFORD, M.Sc., Ph.D. (Brit. Col.), P.Ag., Associate Professor.
R. M. TAIT, B.Sc. (Durham), Ph.D. (Newcastle), P.Ag., Associate Professor.
J. S. SIM, B.S. (Kon-Kuk), M.S. (Manit.), Ph.D. (Brit Col.), Assistant Professor.
B. A. BURTON, M.Sc. (Brit. Col.), D.V.M. (Sask.), Sessional Lecturer (part-time).
W. T. BUCKLEY, B.Sc. (Victoria) Ph.D. (Alta.) Adjunct Professor.
G. W. CUMBERBIRCH, B.Sc. (Agr.) (Brit. Col.) D.V.M. (Sask.), Adjunct Professor.
D. S. EASTMAN B.Sc. (Brit. Col.) MSc. (Aberdeen) Ph.D. (Brit. Col.), Adjunct Professor.
L. J. FISHER, M.Sc. (Sask.), Ph.D. (Cornell), Adjunct Professor.
D. M. HAMILTON, B.S.A., M.S.A. (Brit Col.), Adjunct Professor.
D. A. HIGGS, B.Sc. (Victoria), B.Sc., Ph.D. (Manit.), Adjunct Professor.
E. TOLKSDORFF, D.V.M. (Germany) Dipl. Surgery Vet.Med. (Guelph), Adjunct Professor.
K. R. MacDONALD, D.V.M. (Toronto), Honorary Lecturer.

Department of Bio-Resource Engineering
LEONARD M. STALEY, B.A.Sc. (Brit. Col.), M.Sc. (Calif.), P.Eng., Professor and Head.
N. ROSS BULLEY, B.A.Sc. (Toronto), Ph.D. (Simon Fraser), P.Eng., Professor.
K. VICTOR LO, B.S. (Taiwan), M.S. (Hawaii), Ph.D. (Massachusetts), P.Eng., Professor.
JOHN W. ZAHRADNIK, B.S. (Penn. State), M.S. (Iowa State), Ph.D. (M.I.T.), Professor.
SIE-TAN CHIENG, B.S. (Taiwan), M.Sc., Ph.D. (McGill), P.Eng., Assistant Professor.
PHILIP D. A. JOHNSON, B.A.Sc. (Brit. Col.), M.Sc. (Guelph), P.Eng., Adjunct Professor.
JOHN C. W. KENG, B.Sc. (Taiwan), M.Sc. (Hawaii), Ph.D. (Cornell), Adjunct Professor.
WILLIAM E. MCLEAN, B.Sc., M.Sc. (Brit. Col.), Adjunct Professor.

Department of Food Science
W. D. POWRIE, M.A. (Toronto), Ph.D. (Massachusetts), F.I.F.T., Professor and Head.
S. NAKAI, B.Sc., Ph.D. (Tokyo), Professor.
J. F. RICHARDS, M.Sc. (Manit.), Ph.D. (Minn.), P.Ag., Professor.
P. M. TOWNSLEY, B.S.A. (Brit. Col.), M.S., Ph.D. (Calif.), Professor.
M. A. TUNG, M.S.A., Ph.D. (Brit. Col.), P.Ag., Professor.
E. J. BOWMER, M.C., M.D. (Liverpool), F.R.C.Path., Honorary Professor.
B. J. SKURA, M.Sc. (Alta.), Ph.D. (Brit. Col.), Associate Professor.
J. VANDERSTOEP, M.S.A., Ph.D. (Brit. Col.), P.Ag., Associate Professor.
T. BEVERIDGE, M.Sc., Ph.D. (Brit. Col.), Adjunct Professor.
D. B. CUMMING, M.Sc. (Guelph), Ph.D. (Brit. Col.), Adjunct Professor.
D. D. KITTS, M.Sc., Ph.D. (Brit. Col.), N.S.E.R.C., University Research Fellow.
E. LI-CHAN, M.Sc. (Alberta), Ph.D. (Brit. Col.), Research Associate.
C. WU, M.Sc., Ph.D. (Brit. Col.), Research Associate.
B. MORGAN, B.S.A. (Brit. Col.), Honorary Lecturer.

Department of Plant Science
V. C. RUNECKLES, B.Sc., Ph.D. (London), Dipl. Imp. Coll., F.R.S.A., M.B.C.S.L.A. (Hon.), P.Ag., Professor and Head.
M. SHAW, M.Sc., Ph.D, D.Sc. (McGill), P.Ag., F.A.P.S., F.R.S.C., University Professor of Agricultural Botany.
G. W. EATON, B.S.A. (Toronto), Ph.D. (Ohio State), P.Ag., Professor of Horticulture.
W. G. WELLINGTON, B.A. (Brit. Col.), M.A., Ph.D. (Toronto), F.E.S.C., F.E.C., F.R.S.C., Professor of Plant Science (part-time).
M. WEINTRAUB, B.A., Ph.D. (Toronto), F.N.Y.A.S., Honorary Professor.
R. J. COPEMAN, B.Sc. (McGill), Ph.D. (Wisconsin), Associate Professor.
F. B. HOLL, B.Sc., M.Sc. (Manit.), Ph.D. (Cantab.), P.Ag., Associate Professor.
P. A. JOLLIFFE, B.Sc. (Queen's), Ph.D. (Brit. Col.), Associate Professor.
JUDITH H. MYERS, B.Sc. (Chatham Coll.), M.S. (Tufts), Ph.D. (Indiana), Associate Professor.
M. D. PITT, M.S., Ph.D. (Calif.), Associate Professor.
L. DIAMOND, B.Arch. (Penn), M.Arch. (Toronto), M.L.A. (Calif. Berkeley), Assistant Professor of Landscape Architecture.
M. B. ISMAN, B.Sc., M.Sc. (Brit. Col.), Ph.D. (Calif., Davis), Assistant Professor.
N. R. KNOWLES, B.Sc. (Queen's), M.Sc. (Michigan State), Ph.D. (Washington State), Assistant Professor.
P. A. MILLER, B.S. (Calif. State, Pomona), M.L.A. (Calif. Berkeley), Ph.D. (Michigan), Assistant Professor of Landscape Architecture.
C. R. NORTON, B.Sc., M.Sc. (Reading), M.Sc., Ph.D. (St. Andrews), Assistant Professor.
D. D. PATERSON, B.Sc. (Manitoba), M.L.A. (Michigan), Assistant Professor Landscape Architecture, and Director, B.L.A. Program.
MOURA QUAYLE, B.L.A. (Guelph), M.L.A. (Calif., Berkeley), Assistant Professor.
M. K. UPADHYAYA, B.Sc. (Ag.) (Jawaharlal Nehru Agric.), M.Sc. (Indian Agric. Res. Inst.), M.A. (Princeton), Ph.D. (Michigan), Assistant Professor.
A. R. FORBES, B.A. (Brit. Col.), M.S. (Oregon State), Ph.D. (Calif.), Adjunct Professor.
S. FREYMAN, B.Sc. (Pretoria, S. Africa), M.S.A., Ph.D. (Brit. Col.), Adjunct Professor.
R. I. HAMILTON, B.Sc. (Mont. State), M.Sc., Ph.D. (Nebraska), Adjunct Professor.
N. E. LOONEY, B.S., Ph.D. (Washington State), Adjunct Professor.
R. STACE-SMITH, B.S.A. (Brit. Col.), Ph.D. (Oregon State), Adjunct Professor.
J. H. TREMAINE, M.Sc. (McMaster), Ph.D. (Pittsburgh), Adjunct Professor.
N. S. WRIGHT, M.S.A. (Brit. Col.), Ph.D. (Calif.), Adjunct Professor.
B. FRAZER, B.Sc. (Brit. Col.), Ph.D. (Calif.), Adjunct Professor.
G. G. JACOLI, B.A., Ph.D. (Bologna), Adjunct Professor.

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S. H. DEBOER, B.Sc., M.Sc. (Brit. Col.), Ph.D. (Wisconsin), Adjunct Professor.
T. C. VRAIN, M.S.V. (Caen), Ph.D. (North Carolina State), Adjunct Professor.
M. M. LUCO, B.Sc. (Lethbridge), M.Sc. (Guelph), Sessional Lecturer (part-time).
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JUDITH REEVE, B.A. (Brit Col.), M.L.A. (Oregon), Sessional Lecturer (part-time).
J. J. PHILIPS, B.L.A. (Oregon), Sessional Lecturer (part-time).
R. A. STEVENSON, B.E.S. (Manit.), B.L.A., M.L.A. (Oregon), Sessional Lecturer (part-time).
G. B. STRALEY, B.Sc. (Virginia Poly. and State), M.Sc. (Ohio), Ph.D. (Brit Col.), Sessional Lecturer (part-time).
C. E. TUBESING, B.S.A. (Purdue), Sessional Lecturer (part-time).
A. P. WHARTON, B.Sc. (North Wales), Sessional Lecturer (part-time).
LINDA B. VERBEEK, B.A., M.Sc., Ph.D. (Groningen), Research Associate.
W. T. CRAM, B.S.A. (Brit. Col.), M.S., Ph.D. (Oregon State), Honorary Lecturer.
H. A. DAUBENY, B.S.A., M.S.A. (Brit. Col.), Ph.D. (Cornell), Honorary Lecturer.
H. R. MacCARTHY, B.A. (Brit. Col.), Ph.D. (Calif.), Honorary Lecturer.
R. R. MARTIN, B.S. (For.), Ph.D. (Wisconsin), Honorary Lecturer.
H. S. PEPIN, B.S.A., M.A. (Brit. Col.), Ph.D. (Illinois), Honorary Lecturer.
H. W. J. RAGETLI, Ir., Ph.D. (Wageningen), Honorary Lecturer.
J. RAINE, B.S.A. (Brit. Col.), M.S. (Oregon State), Honorary Lecturer.

Department of Soil Science

L. M. LAVKULICH, M.Sc. (Alta.), Ph.D. (Cornell), Professor and Head.
T. M. BALLARD, M.F., Ph.D. (Washington), Professor.
T. A. BLACK, B.S.A. (Brit. Col.), M.Sc., Ph.D. (Wisconsin), Professor.
L. E. LOWE, M.A. (Oxon), M.Sc., Ph.D. (McGill), Professor.
P. A. MURTHA, B.Sc.F. (Toronto), M.S., Ph.D. (Cornell), Professor.
J. deVRIES, B.Sc. (Alta.), M.S.A. (Toronto), Ph.D. (Washington State), Associate Professor.
A. A. BOMKE, M.S. (South Illinois), Ph.D. (Illinois), Assistant Professor.
M. D. NOVAK, B.Eng. (McGill), M.Sc. (Western Ontario), Ph.D. (Brit. Col.), Assistant Professor.
H. E. SCHREIER, B.A. (Colorado), M.Sc. (Sheffield), Ph.D. (Brit. Col.), Assistant Professor.
C. A. ROWLES, M.Sc. (Sask.), Ph.D. (Minn.), Honorary Professor.
A. J. GREEN, B.Sc.Agr. (Brit. Col.), M.Sc. (Iowa), Adjunct Professor.
S. M. BERCH, B.Sc., M.Sc. (Waterloo), Ph.D. (Laval), N.S.E.R.C. University Research Fellow.
V. G. K. MARSHALL, B.Sc., M.Sc., Ph.D. (McGill), Adjunct Professor.
D. E. MOON, B.Sc., Ph.D. (Brit. Col.), Adjunct Professor.
K. W. G. VALENTINE, B.A., M.A. (Camb.), M.Sc. (McGill), Ph.D. (Reading), Adjunct Professor.
L. VAN VLIET, B.Sc. (Netherlands), M.Sc. (Guelph), Adjunct Professor.

Non-Metropolitan Program

W. E. CARLSON, M.S.A. (Brit. Col.), Ph.D. (Guelph), Sessional Lecturer.
J. S. GAMMIE, M.Sc. (Brit. Col.), D.V.M. (Sask.), Sessional Lecturer.
J. P. ROSS, M.S.A. Ph.D. (Brit. Col.), Sessional Lecturer.

FACULTY OF AGRICULTURAL SCIENCES

The Faculty of Agricultural Sciences offers courses leading to:

1. Bachelor of Science in Agriculture B.Sc. (Agr.)
2. Bachelor of Landscape Architecture B.L.A.
3. Master of Science (M.Sc.), Faculty of Graduate Studies.
4. Doctor of Philosophy (Ph.D.), Faculty of Graduate Studies.

The Faculty of Agricultural Sciences offers a wide selection of courses emphasizing the basic and agricultural sciences in agriculturally related disciplines, with the object of developing an understanding of the appropriate applications of scientific and design principles in students whose aptitudes and interests lie in the natural and social sciences and whose career objectives are directed towards scientific research, business and industry, teaching, or public and private service.

PROGRAMS OF STUDY

Bachelor of Science in Agriculture Degree

The Faculty offers a four-year program of study designed to prepare graduates to enter a wide variety of careers associated with agriculture in business, education, extension, farming, management, marketing, quality control and research in either private enterprise or the public service.

The first two years are devoted mainly to laying a foundation in the sciences and the humanities. The student is also brought into early association with the fundamental agricultural sciences and techniques. In this way the student has the opportunity of obtaining the proper background for specialization in the final two years.

Study programs in the Faculty of Agricultural Sciences are offered in the following departments:

Agricultural Economics	Animal Science
Bio-Resource Engineering (through the Faculty of Applied Science)	Food Science
	Plant Science
	Soil Science

There is sufficient flexibility in the programs of the above departments to accommodate individual student interests. Students with a special interest are advised to consult the Dean who will refer them to appropriate departments. With advice of the Head of the appropriate department, students can select a program of courses that emphasize biotechnology.

Co-operative Education Program: Agricultural Sciences

Co-operative Education integrates study during the winter session (September 1-April 30) with supervised related work in co-operating employer organizations during the summer months (May 1-August 31).

An optional Co-operative Education Program is available for students in Agricultural Sciences. The program is intended to help prepare interested and qualified students for careers in the agriculture and food sector through three consecutive summer work placements that are supervised by practising professionals. Faculty advisers also visit students at their place of work and provide advice on technical reports required of all students on the program.

Applicants to the program must be qualified or completing qualifications for admission to the second or higher years of the B.Sc. (Agr.) program. Selection of students will be based on academic performance and general suitability to the work environment as determined by resume and interview. The total enrolment will be subject to the availability of appropriate work placements. The work placements last a minimum of 3½ months and are arranged by mutual agreement between students and employer organizations. Participating students register for AGSC 199, 299 or 399 as appropriate.

To graduate in the Co-operative Education Program students must complete three work terms in addition to the normal academic requirements. Students who complete less than three courses will have each satisfactorily completed course noted on their academic record.

Detailed information on the program can be obtained from the Office of the Dean, Faculty of Agricultural Sciences or from the Office of Co-operative Education, Room 213 in Brock Hall.

Bachelor of Landscape Architecture Degree

In the Bachelor of Landscape Architecture program, the Faculty offers a four-year program of study designed to prepare graduates for entrance into the profession. The B.L.A. program consists of a core of required courses and a wide range of selective courses, with emphasis, in the second year, on the regional and natural resource aspects of the larger landscape, and, in third year, on the urban setting. In fourth year, students may specialize in one or other of these areas of emphasis.

Master of Science Degree and Doctor of Philosophy Degree

See the Faculty of Graduate Studies section of the calendar.

Veterinary Medicine

The Western College of Veterinary Medicine was established at the University of Saskatchewan to serve the four western provinces. A two-year pre-veterinary program leading to the four-year veterinary program at the University of Saskatchewan may be pursued in the Faculty. Competition for admission to the College of Veterinary Medicine is severe. Pre-veterinary students are, therefore, strongly advised to follow a program which satisfies the requirements for the first two years of the B.Sc. (Agr.) degree at the University of British Columbia as well as for the pre-veterinary program. All students should consult a Faculty pre-veterinary adviser to obtain approval of their programs.

The course requirements for admission to the Western College of Veterinary Medicine at the University of Saskatchewan are:

English	(3)	Chemistry (including Organic)	(6)
Physics	(3)	Mathematics	(3)
Biology or Zoology (including Genetics)	(4½)		

Plus electives to complete two **full** years.

The following selection of courses meets the requirements of the Western College of Veterinary Medicine at the University of Saskatchewan and also those for the first two years of the program for the B.Sc. (Agr.) degree at The University of British Columbia.

1. **Pre-Veterinary students entering the Faculty for the first time in First Year**

First Year:	Units	Second Year:	Units
Agricultural Sciences 100	0	Agricultural Sciences Electives	
Agricultural Sciences 110	1½	(Note 1)	4½
Biology 101 or 102	3	Agricultural Sciences 213	1½
Chemistry 103, 110 or 120	3	Animal Science 258	1½
Economics 100	3	Chemistry 230	3
Mathematics 100	1½	English 100	3
Mathematics 101	1½	Electives	3
Physics 110, 115 or 120	3		
	16½		16½

Note 1: For detailed list of courses see Note 4 below under Requirements for the B.Sc. (Agr.) Degree.

2. Students entering the Faculty for the first time in Second Year with credit for one year of university work, should register for courses to complete the above requirements.

3. It is possible to meet the admission requirements for the W.C.V.M. through some programs in the Faculty of Science. However, this normally takes longer than the minimum two years.

Part-time Students

Students wishing to take less than a full course load should consult the appropriate Department Head or the Dean's Office before registration. Some evening classes are available.

Continuing Education

Specialized non-credit courses in various areas of agriculture are offered periodically. Announcements giving details of the various courses are issued each year, and may be obtained from the Office of the Dean, Faculty of Agricultural Sciences.

Professional Associations

Agrology—Agrology is the profession of applying science and scientific principles to the business and art of agriculture. In British Columbia agrology is recognized by the provincial statute of 1948, the Agrologists Act, under which the British Columbia Institute of Agrologists (B.C.I.A.) is incorporated.

A graduate of the Faculty holding the B.Sc. (Agr.) degree meets the educational requirements for membership in the B.C. Institute of Agrologists.

A graduate who plans to practise as an agrologist in the Province of British Columbia is expected to register as a member of the B.C.I.A. Applications should be forwarded to the Registrar, B.C.I.A., 4631 East Hastings Street, Burnaby, B.C. V5C 2K6.

Landscape Architecture—In order to practise as a Professional Landscape Architect in the Province of British Columbia, it is necessary to be registered as a member in the British Columbia Society of Landscape Architects as laid down in the B.C. Landscape Architects Act. A student who plans to become a landscape architect may enrol with the Society. Applications should be forwarded to the Registrar, B.C. Society of Landscape Architects, 970 Richards Street, Vancouver, B.C. V6B 3C1.

Arrangements exist for students in the Faculty to regularly receive the communications and periodicals of the profession upon payment of a nominal fee. For further information contact the Dean's office.

Study Programs at Other Canadian Universities

The program of study leading to the B.Sc. (Agr.) is similar to programs offered by faculties of agriculture at universities in other provinces in Canada. Students may wish to consider taking a portion of their program at one of these other faculties for subsequent transfer to the University of British Columbia. Interested students are advised to consult the Dean's office for further information.

COURSES LEADING TO THE DEGREE OF B.Sc. (Agr.)

Admission Requirements—See General Information Section on Admission.

Students may gain admission directly from secondary school or on transfer from a recognized university or college, or on the basis of maturity and experience.

Students seeking transfer from other universities or colleges will be granted advance credit for parallel courses in the first two years of the degree program where standings obtained are above the minimum passing grade at the other institutions.

For admission to the B.Sc. (Agr.) program students from Grade 12 British Columbia schools must meet the general University admission requirements and must have completed English 11 and 12; Social Studies 11; French 11 or another approved language 11; Algebra 11 and 12; at least two of Biology 11, Chemistry 11 and Physics 11; a science course numbered '12' chosen from Chemistry 12, Physics 12, Geometry 12, Biology 12, Geology 12; a course numbered '12' chosen from among those listed in the prescribed Senior Secondary School Curriculum in the category 'Arts or Science.'

English Composition Requirement

To qualify for the degree of B.Sc. (Agr.) a student must obtain credit for English 100 and must pass the English Composition Test (E.C.T.). Students (including students transferring from other institutions) who have obtained credit for English 100 but have not passed the Composition Test will write it in late September. The Test will also be given during the December examination period, in late March or April, and in July. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a fee is charged. A "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services. Students who anticipate difficulty passing the Test are advised to enroll in a remedial English course offered by the Centre for Continuing Education. Students who have not met the English Composition Requirement will not normally be permitted to enrol in third year or higher level courses in the Faculty.

Four-Year Course Curriculum

Candidates for the B.Sc. (Agr.) degree must complete 68 units of work as required below; 33 of these units normally are taken in the first two years. The particular program of courses taken by a student in any year must be prepared in consultation with a member of Faculty and must be approved by the head of the department concerned and by the Dean. The student is encouraged to consider related courses given in other departments. Normally no more than 19 units of study may be taken by a student in any one year.

On graduation, honours standing will be granted to those students who obtain an average of at least 80% in the best 33 units of courses selected by the department which meet the requirements of the Third and Fourth Years.

Requirements for the B.Sc. (Agr.) Degree

The faculty requirements set out below pertain to all students pursuing the B.Sc.(Agr.). Students who enter the Faculty for the first time at the second year or third year level must register for required courses from the first and second years.

First Year	Units
Agricultural Sciences 100	0
Agricultural Sciences 110	1½
Biology 101 or 102	3
Mathematics 100 (Note 1)	1½
Mathematics 101 (Note 1)	1½
Chemistry 103, 110 or 120	3
English 100 (Note 2)	3
Economics 100 (Note 2)	3
Totals	16½
Second, Third and Fourth Years (Note 3)	
Agricultural Sciences requirements and electives (Note 4)	4½
Agricultural Sciences 300 (Note 5)	1
Agricultural Sciences 410	1½
Breadth Electives (Note 6)	3
Unrestricted Electives (Note 7)	4½ or 6
Major Program Seminar (423)	1
Major Program Undergraduate Essay (498) or Thesis (499) (Note 8)	1½ or 3
Major Program requirements and electives (Note 9)	31½ or 33
Plant Science 321 or equivalent (Note 10)	1½
Totals:	51½
Minimum units for graduation:	(68)

Notes:

1. Students intending to major in Agricultural Economics may substitute Mathematics 140 and 141 for Mathematics 100 and 101 respectively.
2. Students enrolled in Chemistry 110 or 120 require a suitable Physics course as a co-requisite and therefore may be given permission to defer English 100 or Economics 100 until second year.
3. Students are advised to choose their major field of study no later than the end of second year. Students intending to specialize in Agricultural Economics should have made that choice by the beginning of second year.
4. This requirement may be met by a choice of courses offered within the Faculty but outside the Department in which the student is specializing. The choice normally will be made from the following list: Agricultural Economics 201 (1½), Agricultural Economics 258 (1½), Bio-Resource Engineering 258 (1½), Animal Science 258 (1½), Food Science 258 (1½), Food Science 259 (1½), Plant Science 259 (1½), Soil Science 200 (1½), Soil Science 214 (1½).
5. Normally Agricultural Sciences 300 (Field Trip) is taken prior to the beginning of Third Year.

6. Each student's total program must include a minumum of 3 units of breadth electives chosen from the humanities, fine arts or social sciences (agricultural economics majors also may choose courses in the natural sciences) and approved by the Head of his/her major department.
7. These electives may be chosen so as to provide additional breadth of knowledge in agricultural sciences, or other subjects, to provide additional depth in the major field or to develop a secondary or minor interest area. The choices are to be made in consultation with the head of the department in which the student is majoring.
8. In the graduating year each student is required to prepare a thesis or an essay, the title of which must be approved by the head of the department concerned. Two copies of the report should be deposited by April 1 for Spring graduation or September 15 for Fall graduation.
9. Courses should be chosen to meet the requirements of one of the Undergraduate Study Programs listed below and in consultation with the appropriate department head or his delegate.
10. A student must obtain approval of any course to be substituted for Plant Science 321 from the head of the department in which he is specializing. Students specializing in Agricultural Economics may take Economics 325 and 326 instead of Plant Science 321.

ATTENDANCE, EXAMINATION AND ADVANCEMENT

1. Regular attendance is expected of students in all their classes. Students who neglect their academic work and assignments may be excluded from the final examination. Students who are unavoidably absent because of illness or disability should report to their instructors on return to lecture or laboratory class.
2. Students who are absent from December or April examinations because of illness must submit a certificate obtained from a physician to the University Health Service as soon as possible. If injury or illness did not cause the absence, an explanation of the circumstances should be written to the Dean.

   Applications for special consideration on account of illness or domestic affliction must be submitted in writing to the Dean as soon as possible after the close of the examination period.
3. Formal written examinations are required at the end of all courses terminating in December or April and also in December for courses continuing all year. The formal written examination may be replaced by alternative examination procedures only upon approval of the Head of Department and with permission of the Dean. Passing of the final examination may not be sufficient to pass a particular course but in some courses it may be a requirement. Students may be denied a passing grade for unsatisfactory work during the session or if their essays, reports or examinations are notably deficient in English. Also, in any course which involves both laboratory work and written examinations, students must complete and pass both parts to pass the course.

   Any student whose academic record, as determined by tests and examinations of the first term, is unsatisfactory, may be required to withdraw from the Faculty at any time.

   A passing grade is 50-64%; second class is 65-79%; first class is 80-100%.
4. Students will be classified or promoted according to the following criteria:

   to Second Year Level: Successful completion of 10½ or more units of prescribed courses of first year.

   to Third Year Level: Successful completion of total of 27 or more units including all the required courses of first year and the English Composition Test. Students who do not meet this requirement will not normally be permitted to enrol in third year or higher level of courses in the Faculty.

   to Fourth Year Level: Successful completion of a total of 44½ or more units.
5. Fail standing will be assigned in a session when a student
   (i) has taken a study program of more than 6 units and passed in less than 60% of it; or
   (ii) has taken a study program of 6 or fewer units and passed in less than 50% of it.

   A student who fails a year will normally be required to withdraw from the University for a period of at least one year after which time an appeal for permission to re-enrol will be considered. Before applying for permission to re-enrol, a first or second year student who fails a year is advised to complete satisfactorily (C average or better) those courses outstanding from the failed year at a community college. A student who fails a year but passes in some courses will receive credit for the courses passed upon reinstatement in the Faculty.
6. Probationary status will be assigned to a student
   (a) who is readmitted to the Faculty after having been required to withdraw or
   (b) who passes the Winter Session, but fails in more than 3 units of work or fails to achieve an overall average of 55 per cent on all courses attempted.

   At the end of a probationary year, the student may be reinstated or if there has been insufficient improvement the student will not be permitted to proceed to the next year level.
7. The privilege of writing supplemental examinations may be granted by the Faculty to a student after consideration of the student's complete academic record. The following conditions normally apply:
   (a) the student must have achieved at least pass standing in the session
   (b) the student must have written the final examination and achieved a final grade of at least 40% in the course
   (c) in any session, a student will be granted the privilege of writing supplementals in no more than 3 units except that the Faculty may at its discretion grant supplemental privileges in a further 1½ units to a student whose course load during a full Winter Session is 16½ or more units.
   (d) in all but the final year, a candidate who has been granted a supplemental may write it only once. If the candidate fails, the course must be repeated or a permissible substitute taken. Normally in the final year, a second supplemental examination may be written.
8. In the Winter Session, the total of all courses taken may not exceed 19 units except with approval of the Dean.
9. Students in the Faculty of Agricultural Sciences who wish to take courses at other institutions for transfer of credit toward the B.Sc. (Agr.) or the B.L.A. degrees must obtain permission in advance from the Dean.
10. A student who decides to withdraw but intends to return to the University should obtain a statement of clearance from the Dean's Office to present to the Registrar who will then grant Honourable Dismissal which indicates that the student is in no disciplinary difficulty at the time of withdrawal.

    The Senate of the University may require a student to withdraw from the University at any time for unsatisfactory conduct, for failure to abide by regulations, for unsatisfactory progress or for any other reason which is deemed to show that withdrawal is in the interests of the student or the University.
11. All requests for changes in course registration must be made on the appropriate form. All changes must be approved by the Head(s) of the Department(s) concerned and then by the Dean.

    Except in special circumstances, no program changes will be permitted after two full weeks of the term have elapsed.

    Students wishing to make program changes after the second full week of classes should consult the Office of the Dean and furnish cogent reasons for the request.

    Students may not take courses for which they are not registered and may be considered as having failed in all courses discontinued without approval.

TEACHER EDUCATION COURSE

As well as satisfying the requirements of their own departments in the Faculty, students planning to enter the one-year Program for Graduates (Secondary) through Agricultural Sciences must have Biology 101 or 102, Chemistry 103 or 110 or 120, Mathematics 100 and 101, Economics 100, Physics 110, 115 or 120, and in addition must have at least 9 units of credit in approved courses selected from one of the following: Biological Sciences, Chemistry, Geological Sciences, Mathematics, Physics or other Academic Concentration agreeable to the Faculty of Education. The particular courses should be selected according to the requirements of the Faculty of Education (Academic Concentrations and Majors for Secondary Teachers). Geology 105 or 107 is strongly recommended.

For further particulars see **Faculty of Education** section of calendar.

UNDERGRADUATE STUDY PROGRAMS

Students seeking the degree of B.Sc. (Agr.) must complete the requirements of one of the study programs listed below. The study program must be selected before entering the third year, but it is to a student's advantage to make the choice of program before beginning Second Year.

RANGELAND RESOURCES

Students planning to complete study programs in the Departments of Agricultural Economics, Animal Science, Plant Science or Soil Science may focus their studies on rangeland resources by completing a common core of 19½ units and an additional 15 units chosen to meet the requirements of one of the departments. Common core courses: Agricultural Economics 258 (1½), Animal Science 258 (1½), 421 (1½), Biology 321 (1½), Economics 370 (1½), Physics 110 or 115 or 120 (3), Plant Science 259 (1½), 304 (1½), 320 (1½), 404 (1½), 405 (1½), Soil Science 200 (1½). The additional 16½ units are itemized in the departmental programs which follow. Interested students should consult the appropriate Head or the Dean prior to the beginning of second year for details.

Descriptions of individual courses appear alphabetically by department or faculty in the section, Courses of Instruction.

AGRICULTURAL ECONOMICS

Agricultural Economics is concerned with the commercial and economic aspects of agricultural production and marketing. It is an applied discipline using economic theory to solve problems in the agricultural sector. Questions agricultural economists examine include methods of improving the management of farms and agribusinesses, the marketing and pricing of agricultural products at all levels in the

marketing chain, rural and agricultural development problems, international trade, and resource allocation questions.

Agricultural economists are employed throughout the food system: in farming and input supply industries, in the food processing and retailing sectors, in agricultural development and commodity trade organizations, and in research and government organizations.

Students have considerable flexibility in choosing courses to meet their own interests. Three broad fields of study in the B.Sc. (Agr.) program are available: applied economics, management, and a rangeland resources program. Areas of specialization include the following options: general agricultural economics, agribusiness and management, farm management, international trade and rural development, agricultural marketing and trade, and rangeland resources.

The general agricultural economics option is academically oriented and is of interest to those thinking of a career in research or government positions. The agribusiness and farm management options are suggested for those whose interests lie in the practical and business area of the food system. The marketing, international trade and rural development options are concerned with economics on a more global level. The rangeland resources option is an interdisciplinary program.

Requirements for the Bachelors degree are noted below and for information concerning the Masters and Doctorate degrees the Faculty of Graduate Studies section of the calendar should be consulted.

Requirements for the B.Sc. (Agr.) degree

First Year

Agricultural Sciences 100	0
Agricultural Sciences 110	1½
Biology 101 or 102	3
Chemistry 103 or 110 or 120	3
Economics 100	3
English 100	3
Mathematics 100 and 101 or Mathematics 140 and 141	3
	16½

Management/Applied Economics

Second Year

Agricultural Sciences Electives (Note 1)	4½
Agricultural Economics 201	1½
Agricultural Economics 258	1½
Agricultural Economics 260 (Note 2)	1½
Economics 201 and 202 (Note 3)	3
Breadth Electives (Note 4)	3
Computer Science 114 (or 101)	1½
	16½

Third Year

Agricultural Sciences 300	1
Agricultural Economics Core (Note 5)	4½
Economics 325 and 326 (Note 6)	3
Management/Applied Economics Electives (Note 7)	6
Unrestricted Electives	3
	17½

Fourth Year

Agricultural Sciences 410	1½
Agricultural Economics 423	1
Agricultural Economics 498 or 499	1½ or 3
Agricultural Economics Core (Note 5)	3 or 4½
Management/Applied Economics Electives (Note 7)	4½
Unrestricted Electives	4½
	17½

Rangeland Resources

Second Year

Agricultural Economics 201	1½
Agricultural Economics 258	1½
Breadth Electives (Note 4)	3
Economics 201 and 202	3
Physics 110 or 115 or 120	3
Plant Science 259	1½
Soil Science 200	1½
Unrestricted Elective	1½
	16½

Third Year

Agricultural Sciences 300	1
Agricultural Economics 374	1½
Agricultural Economics 361 (Note 8)	1½
Animal Science 258	1½
Biology 321	1½
Computer Science 114 (or 101)	1½
Economics 325 and 326 (Note 6)	3
Plant Science 304 and 320	3
Unrestricted Electives	3
	17½

Fourth Year

Agricultural Sciences 410	1½
Agricultural Economics 423	1
Agricultural Economics 498 or 499	1½ or 3
Animal Science 421	1½
Economics 370 and 371 or 471	3
Plant Science 404 and 405	3
Unrestricted Electives	4½ or 6
	17½

Notes

1. This requirement may be met by a choice of courses offered within the Faculty but outside the Department. The choice normally will be made from the following list: Animal Science 258 (1½), Bio-Resource Engineering 258 (1½), Food Science 258 (1½), Food Science 259 (1½), Plant Science 259 (1½), Soil Science 200 (1½), Soil Science 214 (1½).
2. Economics 320 may be substituted with Department Head approval.
3. Economics 306 and 307 may be substituted with Department Head approval. Economics 200 is equivalent to Economics 201 and 202.
4. Breadth electives are to be chosen from the humanities, fine arts, social sciences or natural sciences. Courses offered by the Faculty of Agricultural Sciences, Faculty of Commerce and Business Administration and the Department of Economics are specifically excluded. Selected courses must be approved by the Head of the Department.
5. A minimum of 7½ units must be chosen in Third and Fourth years from Agricultural Economics 302, 306, 340, 361, 374, 400, and 420 (Agricultural Economics 407 is required for the Economics option). Additional units may include any Agricultural Economics course.
6. Mathematics 305 and 306, Economics 327 and 329, Plant Science 321 and 322, or Commerce 211 and 212, may be substituted with Department Head approval.
7. Students in the management option may choose from 300 or 400-level courses in the Faculty of Agricultural Sciences and from Commerce 261, 271, 331, 396, 457 or 458. Students in the applied economics option may choose any 300 or 400 level course in Agricultural Economics or Economics.
8. Commerce 410, Foresty 331 or Mathematics 340 may be substituted with Department Head approval.

Courses offered by other faculties

Apart from courses in other faculties listed as requirements for the options in Agricultural Economics, there are many others which could be chosen as electives.

The following departments and faculties offer courses directly complementary to programs of study in Agricultural Economics: Anthropology, Commerce, Computer Science, Economics, Education, Forestry, Geography, Mathematics, Political Science, Psychology and Sociology.

BIO-RESOURCE ENGINEERING

The Department has teaching and research facilities for the study of biological and physical aspects of terrestrial and aquatic food production systems. The Department offers service courses for students who wish to choose electives related to the physical aspects of terrestrial and aquatic food production systems. Appropriate courses are Bio—Resource Engineering 258, 300, 306, 360. Other courses offered by the department may be selected with the prior approval of the Department Head. The Department offers an M.Sc. and for qualified students an Interdisciplinary Ph.D. program can be arranged in the following areas: Bio-environmental control and waste management, irrigation, drainage and hydrology, biomachine systems, food processing systems, and aquacultural systems. For departmental offerings in Bio-Resource Engineering refer to the Faculty of Applied Science.

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ANIMAL SCIENCE

The former Departments of Animal and Poultry Science have been discontinued and their programs transferred to the new Department of Animal Science.

The Department has teaching and research facilities for study in nutrition, physiology, genetics, production management, behaviour, embryology, wildlife management and aquacultural science. Laboratories are located in the main Agricultural Sciences building (H. R. MacMillan Building). Ancillary facilities are available for teaching and research involving avian species (layer, broiler, breeder, quail and pigeon), beef cattle, fish, sheep, swine and wild mammals. Field research areas are available also for studies of livestock and wildlife productivity. Laboraties for experimentation in genetics, nutrition, physiology and embryology are located in the main Agricultural Sciences building (H. R. MacMillan Building).

The Department offers opportunities for study leading to Doctoral, Master's and Bachelor's degrees. For information on the Ph.D. and M.Sc. degree requirements and courses see the Graduate Studies section of the calendar.

Requirements for the B.Sc. (Agr.) degree:

Students enrolled in the B.Sc.(Agr.) program in Animal Science can pursue several areas of special interest (e.g. genetics and breeding, nutrition, physiology, animal and poultry production, wildlife management, aquaculture and embryology). Requirements for the different programs are shown below.

Course Requirements for the B.Sc.(Agr.)

First Year		Second Year	
Agricultural Sciences 100	0	Agricultural Sciences electives (Note 1)	4½
Agricultural Sciences 110	1½	Agricultural Sciences 213	1½
Biology 101 or 102	3	Animal Science 258	1½
Chemistry 103 or 110 or 120	3	Chemistry 230	3
Economics 100	3	English 100	3
Mathematics 100 (or 140)	1½	Electives (Notes 2 and 6)	3
Mathematics 101 (or 141)	1½		
Physics 110 or 115 or 120	3		
	16½		16½

Third and Fourth Years

Agricultural Sciences 300	1
Agricultural Sciences 410	1½
Animal Science 322	1½
Animal Science 423	1
Animal Science 498 or 499 (Note 7)	1½ or 3
Plant Science 321 (or equivalent)	1½
Program requirements and electives (see below)	27 or 25½
	35

Requirements and electives for:

Livestock Program		Poultry Programs	
Animal Science 310 (or equivalent)	1½	Animal Science 307	1½
Animal Science 313 (Note 5)	1½	Animal Science 310	1½
Animal Science 320	3	Animal Science 324	1½
Animal Science 321	1½	Animal Science 415	1½
Animal Science 440 (Note 5)	1½	Animal Science 419	1½
Animal Science 450 (Note 5)	1½	Electives (Notes 2, 3, 4 and 6)	19½ or 18
Animal Science 460 (Note 5)	1½		27 or 25½
Electives (Notes 2, 3, 4 and 6)	15 or 13½		
	27 or 25½		

Rangeland Resources Program

Animal Science 320	3
Animal Science 321	1½
Animal Science 440	1½
Biology 321	1½
Economics 370	1½
Plant Science 304	1½
Plant Science 401	1½
Plant Science 404	1½
Plant Science 405	1½
Soil Science 315 or 416	1½
Electives	(10½ or 9)
	27 or 25½

Notes:

1. The program must include 4½ units offered outside the Department of Animal Science but within the Faculty of Agricultural Sciences. In consultation with a Faculty Adviser these courses should normally be selected from the following: Agricultural Economics 201, 258, Bio-Resource Engineering 258, Food Science 258, 259, Plant Science 259, Soil Science 200, 214. Some of the 4½ unit requirements may be delayed until 3rd year but no later. For the Rangeland Resources option these electives must include Soil Science 200, Plant Science 259, and Agricultural Economics 258.
2. The total program must contain at least 3 units of non-science electives.
3. The following electives are strongly recommended: (a) Microbiology 200 (b) a course in experimental design (c) a course in computer science.
4. The program allows 4½ units of unrestricted electives.
5. Exemptions may be granted to students whose area of interest is wildlife management.
6. Electives must be selected in consultation with a Faculty Adviser.
7. To be selected in consultation with the Head of the Department.

Courses offered by other departments and faculties.

When choosing electives students should consider courses offered by the following Faculties and Departments: Biochemistry, Biology, Botany, Commerce, Computer Science, Forestry, Geography, Mathematics, Microbiology, Pharmaceutical Sciences and Zoology.

FOOD SCIENCE

Food Science is a discipline which encompasses Food Chemistry, Physical Bromatology, Food Process Science and Structural and Environmental Bromatology, with respect to the manufacture, preservation, quality control and development of food products.

Students at the undergraduate level can pursue a general program or an area(s) of special interest through choice of elective courses. The minimum requirement of the Bachelor's degree program in the Department of Food Science is outlined below. Students wishing to specialize in or concentrate on certain areas should consult the Head of the Department.

The department offers M.Sc. and Ph.D. degree programs in the fields of Food Chemistry, Food Microbiology, Structural Bromatology, Environmental Bromatology, Physical Bromatology and Food Process Science.

Requirements for the B.Sc. (Agr.) degree

First Year		Second Year	
Agricultural Sciences 100	0	Agricultural Sciences Electives (Note 1)	4½
Agricultural Sciences 110	1½	Chemistry 230	3
Biology 101 or 102	3	Food Science 259	1½
Chemistry 103 or 110 or 120	3	Physics 110, 115 or 120	3
Mathematics 100 (or 140)	1½	Microbiology 200	3
Mathematics 101 (or 141)	1½	Program Electives (Note 2)	1½
English 100	3		
Economics 100	3		
	16½		16½

Third and Fourth Year

Agricultural Sciences 300	1
Agricultural Sciences 410	1½
Bio-Resource Engineering 300	1½
Food Science 301	1½
Food Science 302	1½
Food Science 303	1½
Food Science 308	1½
Food Science 309	1½
Food Science 423	1
Food Science 499	3
Food Science Electives (Note 3)	4½
Microbiology 307	1½
Plant Science 321 or equivalent	1½
Nutrition Elective (Note 4)	1½
Breadth Elective (Note 5)	3
Program Electives (Note 2)	3
Unrestricted Electives (Note 6)	4½
	35

Notes:

1. The program must include 4½ units of courses chosen from the following list in consultation with a faculty adviser: Agricultural Economics 201, 258; Bio-Resource Engineering 258; Animal Science 258; Plant Science 259; Soil Science 200, 214.
2. Program electives can be chosen from various Departments, Schools and Faculties including: Agricultural Economics, Animal Science, Applied Science, Biochemistry, Bio-Resource Engineering, Botany, Chemistry, Commerce,

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Computer Science, Economics, English, Forestry, Family and Nutritional Sciences, Mathematics, Microbiology, Plant Science, Psychology and Zoology. A list of these is available from the Head of the Department or from a Faculty Advisor. A course in biochemistry taken early in the program is highly recommended.

3. Food Science electives are to be selected such that at least one course is taken from each of: (a) Food Science 401, 410, 412, 414 and
(b) Food Science 402, 416, 418.
4. The nutrition elective is to be selected from Home Economics 203 or 305, or Animal Science 322.
5. Each student's program must contain a minimum of 3 units of electives chosen from the humanities, fine arts or social sciences and approved by the Head of the Department.
6. The unrestricted electives may be chosen so as to provide additional breadth of knowledge in agricultural sciences or other subjects, to provide additional depth in the major field or to develop a secondary or minor interest area. The choices are to be made in consultation with the Head of the Department.

Courses offered by other faculties

Students may wish to select electives from the Departments of Biochemistry, Botany, Chemistry, Computer Science, Economics, Mathematics, Microbiology, Physics, Psychology and Zoology; from the School of Family and Nutritional Sciences (Human Nutrition); and from the Faculties of Applied Science, Commerce and Business Administration, and Education.

PLANT SCIENCE
(Agronomy, Horticulture, Crop Protection, Rangeland Resources)

The department offers opportunities for study leading to Doctoral and Master's degrees and to the degrees of Bachelor of Science in Agriculture, B.Sc. (Agr.), and Bachelor of Landscape Architecture, B.L.A. For information on the Ph.D. and M.Sc. degree programs, see the Faculty of Graduate Studies section of this calendar.

Information on the B.L.A. degree program is given at the end of the Agricultural Sciences section of this calendar.

Fields of study for the B.Sc. (Agr.) degree include agronomy, range management, horticulture, crop physiology, plant pathology, weed science, genetics and plant breeding, and applied entomology, with teaching and research facilities in the main Agricultural Sciences building (H. R. MacMillan Building), the Plant Science Annex, the Horticulture Building and greenhouses, and the Plant Science Field Laboratory (which houses the landscape architecture studios) with its associated arable lands on the Totem and South Campus fields.

Programs for the B.Sc. (Agr.) degree are offered in the following options: agronomy, rangeland resources, horticulture, ornamental horticulture and crop protection. The required and recommended courses are listed below.

Requirements for the B.Sc. (Agr.) degree

First Year		Second Year	
Agricultural Sciences 100	0	Agricultural Sciences 213 (Notes 2 and 3)	1½
Agricultural Sciences 110	1½	Agricultural Sciences Core Requirements (Notes 2 and 4)	4½
Biology 101 or 102	3	Chemistry 230	3
Chemistry 103 or 110 or 120	3	Physics 110 or 115 or 120 (Note 1)	3
Economics 100 (Note 1)	3	Plant Science 258	1½
Mathematics 100 (or 140) and 101 (or 141)	3	Plant Science 259	1½
English 100 (Note 1)	3	Unrestricted Electives (Note 9)	1½
	16½		16½

Third and Fourth Years

Agricultural Sciences 300	1
Agricultural Sciences 410 (Note 5)	1½
Breadth Elective (Note 6)	3
Plant Science 321 or equivalent	1½
Plant Science 324 and 325	3
Plant Science 331	1½
Plant Science 336 (Note 7)	1½
Plant Science 338	1½
Plant Science 423 (Note 5)	1
Plant Science 498 or 499 (Note 5)	1½ or 3
Major (option and program) requirements (Note 8)	12 or 13½
Unrestricted Electives (Note 9)	6 or 3
	35

Notes:

1. Students enrolling in Chemistry 110 or 120 require a suitable Physics course as a co-requisite and therefore may be given permission to defer English 100 or Economics 100 until second year.
2. Some or all of these requirements may be deferred to third year but no later.
3. Students in the Rangeland Resources option are recommended but not required to take Agricultural Sciences 213.
4. Students are required to take a minimum of 4½ units of courses offered outside the Department of Plant Science but within the Faculty of Agricultural Sciences. In order to meet this requirement, students in the Department of Plant Science are required to take Soil Science 200 (1½) in second year. The remaining 3 unit minimum should normally be selected from the following: Agricultural Economics 201 (1½), 258 (1½), Animal Science 258 (1½), Bio-Resource Engineering 258 (½), Food Science 258 (1½), 259 (1½), Soil Science 214 (1½). Soil Science 214 is strongly recommended for students in all options. Agricultural Economics 258 and Animal Science 258 are both required of students in the Agronomy and Rangeland Resources options.
5. Students may not register for these courses before fourth year. However, they should note the requirements for Plant Science 498 and 499 described in the section of the Calendar dealing with Courses of Instruction.
6. Each student's program must contain a minimum of 3 units of electives chosen from the humanities, performing arts or social sciences and approved by the Head of the Department. Certain courses are specifically excluded; a list of these is available from the Department office.
7. Students in the Rangeland Resources option are recommended but not required to take Plant Science 336.
8. Students are required to select an option from those listed below. In the Rangeland Resources option, more than 12 units are listed as required, since the requirement for certain specified courses in the departmental core listed above is waived (see Notes 3 and 7). Students ultimately registering for Plant Science 499 in any option require Plant Science 322 as a prerequisite
9. These electives may be chosen so as to develop additional depth in the major field, to provide additional breadth of knowledge in agricultural sciences, or to develop a secondary or minor field, in consultation with the Head of the Department. To assist in the selection of courses suitable for the development of additional depth in the major field, a choice of recommended electives is listed for each option below.

Agronomy option:

Required: Agricultural Economics 374 (1½); Bio-Resource Engineering 360 (1½); Plant Science 304 (1½), 326 (1½), 406 (1½), 408 (1½); Soil Science 315 (1½), 416 (1½).
Recommended electives: Animal Science 322 (1½); Plant Science 322 (1½), 405 (1½), 413 (1½); Soil Science 333 (1½).

Rangeland Resources option:

Required: Animal Science 421 (1½); Biology 321 (1½); Economics 370 (1½); Plant Science 304 (1½), 326 (1½), 401 (1½), 404 (1½), 405 (1½), 408 (1½).
Recommended electives: Agricultural Economics 374 (1½); Agricultural Sciences 213 (1½); Animal Science 322 (1½); Forestry 442 or Geography 370 (1½); Plant Science 336 (1½); Soil Science 416 (1½).

Horticulture option:

Required: Plant Science 314 (1½), 315 (1½) or 316 (1½), 411 (1½), 412 (1½), 417 (1½), 418 (1½), 433 (1½); Soil Science 315 (1½).
Recommended electives: Agricultural Economics 416 (1½); Plant Science 315 (1½) or 316 (1½), 322 (1½), 326 (1½), 400 (1½), 413 (1½), 414 (1½), 426 (1½).

Ornamental Horticulture option:

Required: Landscape Architecture 220 (1½); Plant Science 314 (1½), 315 (1½) or 316 (1½), 415 (1½), 418 (1½), 433 (1½); Soil Science 315 (1½), and a minimum of 1½ units selected from Forestry 292 (1½) and Landscape Architecture 340 (1½).
Recommended electives: Agricultural Economics 416 (1½); Plant Science 315 (1½) or 316 (1½), 322 (1½), 400 (1½), 413 (1½), 414 (1½), 426 (1½).

Crop Protection option:

Required: Plant Science 431 (1½), 432 (1½) or 437 (1½) or 438 (1½), 433 (1½), 435 (1½) and a minimum of 4½ units selected from Plant Science 406 (1½), 408 (1½), 411 (1½), 412 (1½), 417 (1½).
Recommended electives: Biology 321 (1½), 322 (1½); Botany 308 (1½); Microbiology 200 (3) or 417 (1½); Plant Science 314 (1½), 322 (1½), 326 (1½), 413 (1½), 418 (1½); Soil Science 315 (1½).

Entomology

Courses of study in entomology are offered through the Department of Plant Science, the Faculty of Forestry and the Department of Zoology. The Department of Plant Science offers courses in economic entomology, effects of weather, insect physiology, pesticides, biological control and plant disease vectors. Forestry offers courses in insect ecology and the special problems of forest entomology and forest protection. Zoology offers introductory and advanced courses in general entomology and maintains a museum collection and specialized library.

At the graduate level, research guidance is available in problems relating to classification, structure, function and bionomics of insects, as well as in specialized areas such as biological control, genetics and plant-insect relationships. There are also opportunities for graduate study at the Institute of Animal Resource Ecology in population biology, ecological genetics and mathematical modelling of biological processes. Cooperative research on ultra-structure, biology and population dynamics of plant-disease vectors can be arranged with the Vancouver Research Station of Agriculture Canada, located on campus.

Courses offered by other Departments and Faculties

Courses offered in other Departments and Faculties other than those recommended in the options listed above may be suitable for certain students.

The following Departments and Faculties offer courses suitably complementary to programs of study in Plant Science. Students are reminded that all programs of study must be approved by the Head of the Department.

Agricultural Economics, Biochemistry, Biology, Botany, Commerce, Computer Science, English, Food Science, Forestry, Geography, Geology, Soil Science and Zoology.

SOIL SCIENCE

The Department offers a variety of programs which focus on soil as a basic natural resource and on appropriate utilization of this resource. The relationship of soil to environmental quality is also emphasized. Special reference is made to the subject areas of soil chemistry and fertility, soil genesis and classification, soil physics, soil biology, biometeorology, soil and water conservation, forest soil, land classification, land use, remote sensing techniques and rangeland resources. The Department has laboratories equipped for study in these areas and, in addition, the Province of British Columbia constitutes an exceptional outdoor laboratory for the study of soils. The Department's association with the Faculties of Agricultural Sciences and Forestry, as well as the Surveys and Mapping Branch, Ministry of Environment, Soils Branch, Ministry of Agriculture and Food, and Pedology Section, Agriculture Canada and other resource agencies facilitate the development of programs for studying soil in the field.

The Department's programs are based on a knowledge of chemistry, biology, geology, physics and mathematics and offer work leading to Bachelor's, Master's and Doctor's degrees. Requirements for the Bachelor's degree are noted below and for information concerning the Master's and Doctor's degrees, the Faculty of Graduate Studies section of the calendar should be consulted.

Requirements for B.Sc. (Agr.) Degree (Note 1)

First Year		Second Year	
Agricultural Sciences 100	0	Agricultural Sciences Electives (Note 3)	1½
Agricultural Sciences 110	1½	Chemistry 230, 205 or 208 (Note 4)	3
Biology 101 or 102 (Note 2)	3	English 100	3
Mathematics 100 (or 140) and 101 (or 141)	3	Microbiology 200 (Notes 4 and 5)	3
Chemistry 103, 110 or 120	3	Soil Science 200	1½
Economics 100	3	Soil Science 214	1½
Physics 110 (115 or 120)	3	Geology 105 (Note 5)	3
	16½		16½

Third Year (Note 6)		Fourth Year	
Agricultural Sciences 300	1	Agricultural Sciences 410	1½
Breadth Electives (Note 7)	3	Soil Science 423	1
Plant Science 321 or equivalent	1½	Soil Science 498 or 499	1½ or 3
Agricultural Sciences Electives (Note 3)	3	Soil Science and General Electives (Notes 8 and 9)	12 or 13½
Chemistry 230, 205 or 208 (Note 4)	3		
Soil Science and General Electives (Notes 8 and 9)	6		17½
	17½		

Notes:

1. Although the order in which the courses are listed is a desirable progression, it is recognized that a different sequence may be necessary.
2. See note regarding the placement examination in general biology under the Faculty of Science, biology option.
3. This requirement may be met by a choice of courses offered within the Faculty but outside the Department. The choice should normally be made from the following list: Animal Science 258 (1½), Agricultural Economics 201 (1½), 258 (1½); Bio-Resource Engineering 258 (1½); Food Science 258 (1½), 259 (1½); Plant Science 259 (1½). Students in the rangeland resources option are required to complete Animal Science 258 (1½) and Plant Science 259 (1½).
4. Students in the rangeland resources option are exempted from Chemistry 205 (or 208) and Microbiology 200.
5. Permission may be granted by the Head of the Department of Soil Science to substitute Geology 150 (2) for Geology 105 (3) and/or Microbiology 417 (1½) for Microbiology 200 (3).
6. Programs are offered in the subject areas of Soil Chemistry; Soil Genesis and Classification; Soil Physics and Biometeorology; Soil Conservation and Pollution Control; Forest Soils; Rangeland Resources.
7. Each student's program must include a minimum of 3 units of electives chosen from the humanities, fine arts or social sciences in consultation with the Head.
8. Electives should be chosen in consultation with the Department Head. A minimum of 9 units of Soil Science courses are required exclusive of Soil Science 200, 214, 423 and either 498 or 499. These 9 units are to be selected as follows: 6 units from Soil Science 303 or 315 and 404, 413 and 416 and 3 units from Soil Science 311, 321, 333, 414, 417, 418, 419, 430, 442, and 443. Students are recommended to take a course in remote sensing, e.g., Soil Science 442 or 443 and in computer science. The program allows 4½ or 6 units of unrestricted electives depending on choice of Soil Science 498 (1½) or Soil Science 499 (3).
9. Students in the Rangeland Resources option must complete the following courses: Agricultural Economics 258 (1½); Animal Science 421 (1½); Biology 321 (1½); Economics 370 (1½); Plant Science 304 (1½), 401 (1½), 404 (1½), 405 (1½); Soil Science 315 (1½), 333 (1½), 416 (1½), and either 442 (1½) or 443 (1½). The program allows 6 units of unrestricted electives.

Electives

When choosing electives, students should consider courses from the Faculties of Agricultural Sciences, Applied Science, Arts and Forestry and the Departments of Biochemistry, Biology, Botany, Chemistry, Computer Science, Economics, Geography, Geological Sciences, Geophysics, Mathematics, Microbiology, Physics and Zoology.

AGRICULTURAL MECHANICS

The following courses will be offered for the last time in the 1987-88 session. They have been retained to allow program completion by students already enrolled in the Agricultural Mechanics B.Sc. (Agr.) program. Admission to the latter program has been discontinued.

Agricultural Mechanics 423 Seminar	(1)
Agricultural Mechanics 430 Directed Studies	(1-3)c
Agricultural Mechanics 499 Ungerdraduate Thesis	(3)
	16½

LANDSCAPE ARCHITECTURE

COURSES LEADING TO THE DEGREE OF B.L.A.

The Department of Plant Science offers opportunities for study leading to the Bachelor of Landscape Architecture (B.L.A.) degree. The landscape architecture studios are located in the Plant Science Field Laboratory.

Admission Requirements:

For admission to the Bachelor of Landscape Architecture program, students from Grade 12 British Columbia Schools must meet the general University admission requirements and must have completed English 11 and 12; Social Studies 11; French 11 or a foreign language 11; Algebra 11 and 12; Biology 11 and either Chemistry 11 or Physics 11; a science course numbered 12 (Biology 12 strongly recommended); a social science '12' (preferably Geography 12). Students may also gain admission on the basis of maturity and experience, or on transfer from a recognized university or college. Because of the structure of the program students seeking transfer from other universities or colleges will be granted advanced credit for parallel courses in the first two years of the program up to a maximum of 15 units, where standings obtained are above the minimum passing grade at other institutions. However, no student will be admitted to second year without prior credit for Landscape Architecture 100 and 150 or their equivalents.

It should be noted that completion of the academic requirements does not guarantee admission to the program.

Admission is restricted and selection is based on academic standing, personal suitability and creative ability. The selection process entails completion of a supplementary application form, and will require a personal interview and the submission of evidence of creative ability. Application forms may be obtained from the Office of the Registrar. Deadline for application is April 30.

English Composition Requirement as for the B.Sc. (Agr.) degree.

Requirements for the B.L.A. Degree

Candidates for the B.L.A. degree must complete a minimum of 68 units of work. The program consists of a core of required courses and extensive lists of selective courses. The particular program of courses taken by a student in any year must be prepared in consultation with the Director of the Landscape Architecture Program, and approved by the Head of the Department of Plant Science, and the Dean.

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A student's standing at graduation will be determined by averaging the marks obtained in the best 36 units of coursework completed in the second, third or fourth years including the core courses specified in each of those years.

The detailed requirements for the B.L.A. degree are presented below as a Department Study Program in the Department of Plant Science.

First Year		Second Year	
Landscape Architecture 100	1½	Landscape Architecture 200	4½
Landscape Architecture 150	3	Landscape Architecture 220	1½
Landscape Architecture 199	1	Economics 100	3
English 100	3	Forestry 202	1½
Forestry 292	1½	Geography 350	1½
Geography 101	3	Recommended electives	
Geography 200	1½	(Notes 1 and 2)	4½
Plant Science 110 (or 259)	1½		16½
Soil Science 300 (or 200)	1½		
	17½		
Third Year		**Fourth Year**	
Landscape Architecture 300	4½	Landscape Architecture 400	4½
Landscape Architecture 340	1½	Landscape Architecture 401	3
Landscape Architecture 350	1½	Landscape Architecture 450	1
Architecture 472	1½	Plant Science 415	1½
Plant Science 316	1½	Recommended electives	
Recommended electives		(Notes 1 and 2)	4½
(Notes 1 and 2)	6	Arts elective (Note 3)	3
	16½		17½

Notes:

1. All students are advised that their complete programs of courses must be approved by the Director of the Landscape Architecture Program and the Head of the Department.
2. Recommended elective courses are listed in a brochure available from the Department. They include a wide range of courses in the following fields: architecture, commerce, economics, fine arts, forestry, geography, planning, plant science, psychology, recreation, sociology, soil science, statistics and urban studies.
3. During the program, students are required to complete 3 units of coursework from the Faculty of Arts, exclusive of courses in the required core or in the lists of recommended electives (see Note 1). Students are directed towards courses in fields such as anthropology, English, history, philosophy and political science in order to meet this requirement, which may be fulfilled in any year of the program.

Agriculture Canada

Research Branch

Vancouver Research Station

M. Weintraub, B.A., Ph.D. (Toronto), F.N.Y.A.S., Director,

Honorary Professor of Plant Science

The Vancouver Research Station of Agriculture Canada is the national Research Branch centre for the study of plant viruses. It also has regional research responsibilities. Its plant virus research program includes studies in the structure of the virus particles, the purification and physico-chemical characterization of the viruses, the infection process and subsequent synthesis of the virus, and virus-host interactions through ultrastructural and metabolic researches.

Research is also carried on in plant pathology (fungi and nematodes), in entomology (insect pests of vegetables and small fruits), and in pedology (soil surveys, classification and interpretation of B.C. soils).

The Station is on the Campus at 6660 N.W. Marine Drive, and co-operates closely with the Faculty of Agricultural Sciences.

The Dr. and Mrs. A. S. Dekaban Foundation

The Foundation was established by Dr. and Mrs. A. S. Dekaban primarily to permit graduate students from the Polish agricultural universities to study in the Faculty of Agricultural Sciences. Polish students may spend up to six months in the Faculty, undertaking research related to their study program in their home institution. The students are selected by the Polish agricultural universities. The Foundation also supports occasional short-term visits by members of the Faculty of Agricultural Sciences to Polish agricultural universities and vists by scientists from the Polish agricultural universities to the Faculty.

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J. A. H. LUND, B.A.Sc. (Brit. Col.), Ph.D. (Birmingham), P.Eng., Professor.
A. MITCHELL, B.A., M.A., D.Phil. (Oxon), P.Eng., C.Eng., Professor.
E. PETERS, B.A.Sc., M.A.Sc., Ph.D. (Brit. Col.), P.Eng., Professor.
E. TEGHTSOONIAN, B.A.Sc., M.A., Ph.D. (Toronto), P.Eng., Professor.
D. TROMANS, B.Sc., Ph.D. (Leeds), Professor.
F. WEINBERG, B.A.Sc., M.A., Ph.D. (Toronto), P.Eng., Professor.
N. R. RISEBROUGH, B.A.Sc., M.S.Sc. (Toronto), Ph.D. (Brit. Col.), Associate Professor.
R. G. BUTTERS, B.A.Sc., M.A.Sc. (Brit. Col.), Assistant Professor.
W. S. DUNBAR, M.Sc. (Toronto), Ph.D. (Stanford), P. Eng., Assistant Professor.
A. POURSARTIP, M.A., Ph.D. (Cantab.), Assistant Professor.
G. G. RICHARDS, B.A.Sc., Ph.D. (Brit. Col.), Assistant Professor.
I. SAMARASEKERA, B.Sc. (Sri Lanka), M.Sc. (California), Ph.D. (Brit. Col.), P.Eng., Assistant Professor.
I. H. WARREN, B.Sc., Ph.D. (London), Honorary Professor.
W. G. BACON, B.A.Sc., Ph.D. (Brit. Col.), Adjunct Professor.
J. E. LAIT, B.A.Sc., M.A.Sc. (Brit. Col.), Adjunct Professor.
R. H. SUN, Honorary Research Associate.
Y. TANAKA, Honorary Research Associate.
S. TONG, Honorary Research Associate.

Department of Mining and Mineral Process Engineering
G. W. POLING, M.Sc., Ph.D. (Alta.), P.Eng., M.C.I.M., F.I.M.M., M.A.I.M.E., Professor and Acting Head of the Department.
C. O. BRAWNER, B.Sc. (Man.), M.Sc. (N.S.T.C.), P.Eng., (M.A.I.M.E.), Professor.

J. LASKOWSKI, B.Sc., M.Sc., Ph.D., D.Sc. (Silesian Univ. of Technology), M.C.I.M., M. Amer. Chem. Soc., Professor.
A. L. MULAR, M.Sc. (Mont. Sch. of Mines), P.Eng., M.C.I.M., A.I.M.E. Professor.
H. D. S. MILLER, B.Sc. (Cardiff), Ph.D. (Newcastle), M.I.S.R.M., M.I.M.M., M.C.I.M., Associate Professor.
A. E. HALL, B.Eng. (Sheffield), Ph.D. (Nottingham), M.C.I.M., Assistant Professor.
A. J. REED, B.Sc. (Leeds), Assistant Professor.

Lecturers from other Departments
C. I. GODWIN, B.A.Sc., Ph.D. (Brit. Col.), Associate Professor, Department of Geological Sciences.

Adjunct Professors
W. G. BACON, B.A.Sc. (Met.), Ph.D., M.C.I.M., M.A.I.M.E., F.I.M.M., P.Eng.
M. J. A. BEATTIE, B.A.Sc., M.A.Sc., Ph.D. (Brit. Col.)
E. HOEK, B.Sc., M.Sc., Ph.D., D.Sc. F.I.M.M. F.G.S. of London, P.Eng.
D. G. OSBORNE, B.Sc., Ph.D. (Newcastle).
A. D. WALTERS, M.Eng., (Penn. State).

FACULTY OF APPLIED SCIENCE

The Faculty of Applied Science offers undergraduate and graduate programs in Engineering, Architecture, and Nursing.

Seven Departments and two Boards of Study offer programs in Engineering. The two Schools in the Faculty, Architecture and Nursing, offer programs in their respective disciplines, which are described in separate sections of the Calendar.

ENGINEERING

The Faculty offers programs of undergraduate study leading to the Bachelor of Applied Science (B.A.Sc.) degree in the following areas of engineering:

1. Bio-Resource Engineering
2. Chemical Engineering
3. Civil Engineering
4. Electrical Engineering
5. Geological Engineering
6. Mechanical Engineering
7. Metallurgical Engineering
8. Mining and Mineral Process Engineering
9. Engineering Physics

The Faculty of Applied Science admits suitably qualified applicants directly from secondary school into First Year Engineering. These students will normally complete the B.A.Sc. degree in four years, except in the case of Engineering Physics which requires five years. However, significant numbers of students enter the Engineering program after spending one year in the Faculty of Science, thus taking five years to complete the B.A.Sc. degree. Students may choose the five-year route either because they wish to avail themselves of a broader range of electives or because they do not meet the entrance requirements for admission directly from secondary school.

Entrance standards require that the student must have completed, with high standing, courses in mathematics and the sciences. Practical work outside the University, scheduled field trips, and the activities of professional and technical societies all contribute to the rounding out of the undergraduate programs and students are expected to participate in them as fully as circumstances permit.

Extension of engineering studies at the post-graduate level is becoming increasingly important. The Faculty offers post-graduate programs and provides research facilities in many areas of engineering for students proceeding to the degree of Master of Applied Science, Master of Engineering or Doctor of Philosophy. The requirements for entrance to these programs are set out fully in the Faculty of Graduate Studies section of the Calendar. In general it may be stated that acceptance as a candidate for a Master's degree requires a high level of accomplishment in the undergraduate program. For the M.A.Sc. degree a substantial program of academic courses and research, occupying at least twelve months, is required. For the M.Eng. degree, additional academic courses are required in lieu of a thesis. Acceptance as a candidate for the Ph.D. degree requires demonstrated academic and research ability; the program of studies and research occupies at least two years' resident study beyond the level of the Master's degree. For these degrees, competence in at least one additional language besides English may be required.

Part-Time Study

The Faculty will consider proposals from qualified applicants for part-time study towards the degree of B.A.Sc. Since the flexibility for such study may be limited, approval must be obtained from the Office of the Dean.

The M.Eng. degree may be obtained by part-time study in all departments. Part-time study towards the M.A.Sc. degree is permitted in some departments.

Admission — Undergraduate Programs

The Faculty welcomes applications from well-qualified students. Application for admission to the Engineering program must be made through the Office of the Registrar, on the appropriate form, **not later than May 31.** New applicants to the University must submit an Application for Admission; former University of British Columbia students must submit an Application for Re-admission. All necessary documents, including official transcripts, must be received by the Office of the Registrar **by June 30** to ensure that the application will be considered. Responsibility for ensuring that the forwarding institution sends the official transcripts by June 30 rests with the applicant.

Due to limited resources, the Faculty has been authorized to restrict enrolment in first year Engineering, and within specific Engineering programs at the second year level. **Attainment of the minimum academic requirements listed below means that the applicant is eligible for selection, but does not provide assurance of admission.** The selection is based on academic standing. In most cases, the competition for places is such that standing above the minimum prescribed requirements is necessary to ensure admission. Students previously registered in the Faculty of Applied Science who were required to withdraw following a failed year will normally be considered only after other eligible candidates have been placed.

Admission from B.C. Grade 12 (or the equivalent) — In addition to satisfying general University admission requirements, applicants must have completed Algebra, Physics, and Chemistry at the British Columbia Grade 12 level or the equivalent. Where possible, it is recommended that applicants complete Geometry 12 and Enriched Algebra 12 (in place of Algebra 12). Students will be selected on the basis of their standings in Grades 11 and 12 courses in Algebra, Chemistry, Physics and English. Applicants from schools where either Physics 12 or Chemistry 12 cannot be completed may petition to be excused this deficiency. NOTE: The University is prepared to offer early admission to Secondary School students graduating in June of 1986 based on interim or projected final grades submitted by the schools.

Admission From Science — Applicants who have taken first year Science at UBC are eligible to be considered if they have achieved an overall average of at least 55% on all courses, including any failed courses, and at least 60% in each of Mathematics (60% average in Mathematics 100 and 101, minimum 60% in Mathematics 101), Physics and Chemistry; applicants from a college or another university are eligible for consideration if they have achieved an overall gradepoint average of at least 2.5, including any failed courses, with a gradepoint average of at least 2.7 in Mathematics, Physics and Chemistry with no grade less than "C" in these subjects.

Applicants who have taken two or more years of Science normally must have an overall average (including all years and any failed courses) of at least 65 per cent.

Applicants from First Year Science at The University of British Columbia or an approved university or college should have taken the following prerequisite subjects:

	Units
English 100 (Literature and Composition).	3
Mathematics 100 and 101 (or 120 and 121).	3
Chemistry 110 or 120.	3
Physics — one of 110, 115 or 120.	3
Appropriate elective	3
	15

Admission from UBC Engineering Transfer Programs — Students who have completed first year Engineering at a college offering a UBC transfer program are eligible to be considered for admission to second year Engineering provided that they have obtained an overall gradepoint average of at least 2.5.

Admission from Engineering Programs at Other Universities — Engineering students attending other universities and wishing to transfer to the Faculty of Applied Science at UBC will be considered on an individual basis. A high second class standing is normally required for admission; students who have been required to withdraw from an engineering program at another university will not be considered.

Admission Following Two-Year Technology Diploma Programs — Students are eligible to be considered for admission if they have completed an appropriate two year Technology Diploma Program with an overall average of at least 70%. Admission is normally into first-year Engineering.

Mature Students (B.C. Residents Only) — Applicants who do not meet the normal University or Faculty requirements for admission, but who have relevant work experience in Engineering, may be considered for admission on the written recommendation of a registered Professional Engineer who is familiar with the applicant's work. Mature student applications are considered on an individual basis and are subject to the approval of the Senate Admissions Committee.

Mathematics — The attention of applicants is drawn to the importance of mathematics as a preparation for engineering courses. Experience has shown that U.B.C. students with grades below 65 per cent in mathematics (below B at a college) are likely to have difficulty with many engineering courses.

English Composition Requirement

To qualify for the degree of B.A.Sc. a student must obtain credit for English 100 and must pass the English Composition Test (ECT). Students (including students transferring from other institutions) who have obtained credit for English 100 but who have not passed the Composition Test will write it in late September. This Test will also be given during the December examination period, in late March or April, and in July. Each student must attach a fee sticker to the ECT booklet. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services.

Registration

There is no pre-registration in Engineering. Students who are accepted will be notified of the time and place of registration and must register in person. Students wishing counselling or advance credit should not wait until registration week but should contact the Dean's Office for an appointment during the summer and, in any event, not later than September 1.

Students who are unable to register during registration week should contact the Dean's Office before the first day of registration for permission to register late. If permission is granted, a fee for late registration will be charged.

Degree Requirements

A student shall be granted a B.A.Sc. degree only after obtaining credit for all courses listed in the program of study for a given Engineering Department. This requirement will normally be met by completing four Winter Sessions with full unit load. With the approval of the Office of the Dean a student may be allowed to study on a part-time basis. Credit may be granted for courses completed during the Spring or Summer Sessions.

A student transferring from an Engineering program at another university or from a Science Faculty may be granted transfer credit for certain courses if the student has completed courses of equivalent content. Some courses may also be waived if the student has credit for other courses which provide an alternate broad background of knowledge in areas which may be of benefit in the branch of Engineering concerned. Such waiving of courses must be approved by the Office of the Dean with the concurrence of the Head of the Department concerned.

Honours Standing

On graduation a student will be granted Honours standing if he/she obtains a First-Class standing in the Winter Session of the Final Year and **either** a minimum of 75% with no failed courses in each of the preceding three Winter Sessions **or**, if the minimum of 75% is not achieved in one or more of the preceding three Winter Sessions, an overall average in the four years of 80% or higher, with no failed-courses. To be eligible a student must have had full-time status for all four years.

Elective Courses in Engineering Program

Students are advised that enrolment in elective courses offered within the Faculty may be restricted.

Humanities Elective Courses

Humanities Elective courses totalling 7½ units (in addition to English 100 which is a required course) should be selected from courses given in the Faculty of Arts which are not mathematical or scientific in content. Some courses given by the Faculty of Commerce also are acceptable. All students must obtain credit for either Economics 100 or Economics 309 before graduation and one of these should be taken as a Humanities Elective. Applied Science 260, Technology and Society, is offered by the Faculty of Applied Science and students are advised to consider this course as a Humanities Elective. A list of possible Humanities Electives that fit the timetables for the Engineering programs will be available at Registration.

Student Classification

Regular students are classified as "full time" or "part time" as follows:

A "full time" student shall have a course load in the Winter Session such that the sum of his/her session units plus any advance credit units is equal to or greater than the full unit load of the Year and Department in which the student is registered, provided that his/her session units are at least 80% of the full unit load. Courses required for the 80% minimum may be from the next higher year. A student may take more than the full unit load with the approval of the Office of the Dean. **Note that the Faculty's definition of full time status is not the same as that used by the Awards Office in determining eligibility for financial assistance. Students wishing to ensure that they are eligible for consideration for scholarships or other forms of award should check with the Awards Office.**

A student who has approval for a unit load in a Winter Session which is less than that required for full-time status shall be classified as a "part-time" student. A part-time student will not normally be eligible for scholarships or for Honours standing.

A student who is taking courses from more than one year level shall normally be given year status based on the program year of the majority of units being taken.

Examinations

Examinations are held in December and in April.

Applications for special consideration for examinations missed on account of illness or domestic affliction must be submitted to the Dean as soon as possible after the close of the examination period. For information regarding medical certificates see the General Information section of the Calendar.

Advancement

The minimum passing mark in each course is 50 per cent. In any course which includes both lecture and laboratory work a student must pass in the material of both components before standing in the subject will be granted. Grades in individual courses are as follows: Class I, 80% or over; Class II, 65% to 79%; Pass, 50% to 64%. Year standing is also given on the same basis but applies only to students who are taking a full program of study.

In order to pass the year, a student must **both** obtain an overall average of at least 55 per cent in the Winter Session **and** pass in 65% of his/her unit load. A student who fails a year will be required to discontinue his studies in the Faculty for at least one year but is eligible to apply for readmission after that year. A student who fails a second time in University studies will be required to withdraw.

A student who withdraws during the second term of the Winter Session after obtaining less than 50% on the Christmas examinations will not be readmitted for the following Winter Session but is eligible to apply for readmission after that year.

Any student whose academic record, as determined by the tests and examinations of the first term, is found to be unsatisfactory, may be required to discontinue attendance at the University for the remainder of the Session.

Term essays and examination papers may be refused a passing mark if they are noticeably deficient in English.

In a failed year a student will be granted credit for all courses passed.

Supplemental Examinations

A student in a Winter Session who is not classified as "Fail" but who has failures in some courses, may write supplemental examinations in all failed engineering courses in which supplemental examinations are available, and in such other courses as regulations permit, in which a final grade of not less than 40 per cent is achieved. Such examinations may be written only once, normally during the supplemental examination period in July-August but not in December. In the Fourth Year a supplemental may be written twice.

Supplemental examinations for courses which terminate at Christmas will normally be made available to students only during the supplemental examination period in July-August.

Probation

A student who has passed the previous Winter Session but still has failed courses outstanding from that session after the supplemental examinations may be placed on "probation". The following regulations apply for probation students:

(i) deficient courses must be repeated during the year of probation
(ii) year status will be that of the majority of units being taken.
(iii) a student with 3 units or less of deficient courses may register for the full program of study of the next higher year
(iv) a student with more than 3 units of deficient courses may take courses from the next higher year but the total unit value of such courses shall not exceed 65% of the full unit load of the year and Department concerned.

Any student who does not pass the deficient courses within the probationary academic year shall have his academic record reviewed by the Committee on Admissions and Standing and may be asked to withdraw as a regular student from the Faculty until the course deficiencies are made up.

Appeals and Appeal Procedure

Please refer to General Information Section of Calendar — see Index "Appeals."

Practical Work Outside the University

Before a degree will be granted, a candidate may be required to satisfy the department concerned that he has completed a suitable amount of practical work related to his chosen profession.

Practical work such as shopwork, freehand drawing, mechanical drawing, surveying, etc., done outside the University may be accepted in lieu of laboratory or field work (but not in lieu of lectures) in these subjects on the recommendation of the head of the department and with the approval of the Dean. Students seeking this exemption must make written application to the Dean before April 1.

Field Trips

Students who may be required to participate in field trips will be responsible for expenses incurred in such trips.

Co-operative Education Programs

Co-operative Education at UBC integrates academic study with related and supervised work experience in co-operating employer organizations.

The Engineering Co-operative Education Program is optional and is intended to prepare interested and qualified students in all branches of engineering for their future careers. The normal Program requires three consecutive summer work placements. Faculty advisers visit students at their places of work and provide advice on technical reports that are required of all students in the Program.

In addition to the normal Program, Electrical Engineering Co-op students have the option of a year-round Co-op schedule, which includes five required work placements: one for four months and two double placements lasting eight months each. Students on the year-round schedule will require an extra year to complete their degree program; those on the summer work placement schedule will not require the extra year.

Students who wish to be considered for the Program must meet all requirements of the Faculty of Applied Science (Engineering) and will be selected on the basis of academic performance and suitability for the work environment. The total enrolment is subject to the availability of appropriate work-placements. Accepted students will register in the appropriate non-credit Co-operative Education courses: APSC 110, 210, 310 and 410, and will be required to pay a nominal Co-op fee. Completion of each of these courses will be recorded on the student's academic transcript.

To graduate in either the summer-only or the year-round Co-operative Education Program, a student must have completed the required number of work placements satisfactorily, in addition to the normal academic requirements.

Application for admission to the Co-operative Education Program in Engineering should be made to the Office of Co-operative Education, Brock Hall, The University of British Columbia, 1874 East Mall, Vancouver, B.C. V6T 1W5.

Surveying Engineering

A four-year program leading to the granting of a Bachelor of Science degree in Surveying Engineering has been introduced at The University of Calgary. After appropriate practical experience, a graduate may register as a Professional Surveying Engineer and/or a Provincial Land Surveyor and/or a Canada Lands Surveyor.

Students interested in a career in Surveying may take the first two years of the program at the University of British Columbia, registering in the Department of Civil Engineering when they enter second year. CIVL 435 is taken in place of the second year humanities elective. If successful, they will then be admitted to The University of Calgary to take the third and fourth years of the program there. Please consult the Dean's Office or the Department of Civil Engineering for further information.

Professional Associations

The right to practise engineering and accept professional responsibility in Canada is limited to those who are registered members of the Association of Professional Engineers in the Province concerned. All engineering undergraduates at U.B.C. are automatically enrolled as Engineering Pupils in the Association of Professional Engineers of B.C. During the period between graduation and registration the graduate who intends to practise in B.C. should be enrolled with the Association as an 'Engineer in Training'.

The B.A.Sc. degree programs at U.B.C. in Bio-Resource, Chemical, Civil, Electrical, Geological, Mechanical, Metallurgical, Mining and Mineral Process Engineering and in Engineering Physics are accredited by the Canadian Accreditation Board (C.A.B.) of the Canadian Council of Professional Engineers. Graduates of C.A.B. accredited programs are accepted as being fully qualified academically for professional engineering registration anywhere in Canada. However, there are also experience qualifications and professional practice requirements that must be fulfilled before full registration is granted. These qualifications vary within Canada and applicants should obtain the necessary details from the appropriate Association(s).

CURRICULA

In the following curricula, First, Second and Third Years are from the NEW FOUR-YEAR PROGRAM but Fourth Year is from the OLD PROGRAM.

FIRST YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 120 (0) Intro. to Engineering	1	—	—	—	—	—
APSC 151 (1½) Engineering Graphics	1	—	4	—	—	—
CHEM 150 (2) Engineering Chemistry	—	—	—	4	3*	1.5*
CPSC 151 (1½) Princ. of Computer Prog.	3	—	1	—	—	—
ENGL 100 (3) Literature & Composition	3	—	—	3	—	—
GEOL 150 (1½) Earth Science	3	2	—	—	—	—
MATH 152 (1½) Linear Algebra & Diff. Eq.	—	—	—	3	—	—
MATH 153 (1½) Differential Calculus	3	—	1	—	—	—
MATH 154 (1½) Integral Calculus	—	—	—	3	—	1
PHYS 150 (2) Thermodynamics & Waves	—	—	—	4	3	—
PHYS 170 (1½) Statics	3	—	2	—	—	—
PHYS 175 (1½) Dynamics	—	—	—	3	—	2

TYPICAL TRANSFER PROGRAM FOLLOWING FIRST YEAR SCIENCE

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 120 (0) Intro. to Engineering	1	—	—	—	—	—
APSC 151 (1½) Engineering Graphics	—	—	—	1	—	4
CPSC 151 (1½) Princ. of Computer Prog.	—	—	—	3	—	1
GEOL 150 (1½) Earth Science	—	—	—	3	2	—
MATH 152 (1½) Linear Algebra & Diff. Eq.	3	—	—	—	—	—
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Differential Equations I	—	—	—	3	—	—
PHYS 156 (1½) Heat & Thermodynamics	2	3*	1	—	—	—
PHYS 170 (1½) Statics	3	—	2	—	—	—
PHYS 175 (1½) Dynamics	—	—	—	3	—	2
†Humanities Elective (3)	3	—	—	3	—	—
Additional electives to bring load to 18 units, if student is exempt one or more courses						

†Please refer to the statement headed "Humanities Elective Courses" above.
*Alternate weeks.

SECOND, THIRD AND FOURTH YEARS

Third and Fourth Year Essays, Reports and Theses
Refer to departmental requirements.

Options in Third and Fourth Years

In some departments selected groups of courses are offered as options which represent different areas of interest, some designed for students who prefer the approach to engineering practice or operation, others for students who are inclined to the more mathematical or scientific aspects of engineering or who may be considering a career in research and development. In some departments the options or electives are intended to offer a choice of field without distinction between applied and scientific concepts. High-quality performance in any option or field qualifies the student to continue his studies at the graduate level if he chooses to do so. All students entering Third Year must consult representatives of the departments concerned before registering for the courses offered.

1. Bio-Resource Engineering

SECOND YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
BIOE 250 (1½) Biosystems for Engineers	2	—	2	—	—	—
BIOE 285 (1½) Intro to Bio-Resource Engineering Analysis	—	—	—	2	—	2
CIVL 215 (1½) Fluid Mechanics	3	—	2	—	—	—
CIVL 230 (1½) Solid Mechanics I	3	—	2	—	—	—
CIVL 232 (1½) Dynamics II	3	—	1	—	—	—
CIVL 235 (2) Plane Surveying	At end of 2nd Term, 1st Year					
ELEC 263 (1½) Applied Electrical Circuits & Devices	2	2*	1	—	—	—
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Equations	—	—	—	3	—	—
MECH 270 (1) Principles of Energy Conversion	—	—	—	2	—	—
STAT 251 (1½) Elem. Statistics	—	—	—	3	—	—
†Humanities Elective (1½)	—	—	—	3	—	—

*Denotes that the Lab. or Prob. period is every other week.
†Please refer to the statement Headed "Humanities Elective Courses" above.
(Note: In 1986/87, ELEC 263 may be replaced by BIOE 355, and the Humanities electives increased to 3 units).

THIRD YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 380 (1½) Introduction to Microcomputers	2	3*	2*	—	—	—
BIOE 355 (1½) Physical Properties of Plant and Animal Materials	2	2*	2*	—	—	—
BIOE 356 (1½) Principles and Engineering Applications of Plant Physiology	2	—	2	—	—	—
BIOE 357 (1½) Principles and Engineering Applications of Animal Physiology	—	—	—	2	—	2

1. Bio-Resource Engineering—Continued

BIOE 361 (1½) Soil and Water Engineering..	—	—	—	2	2*	2*
BIOE 366 (1½) Heat Transfer	3	—	—	—	—	—
BIOE 376 (1½) Applications of Heat, Mass and Momentum Transfer	—	—	—	2	—	2
ELEC 370 (1½) Electrical Machines and Power Transmission	—	—	—	2	2*	1
MICB 417 (1½) Principles of Applied Microbiology	2	1	—	—	—	—
SOIL 413 (1½) Physical Behaviour of Soils..	3	2	—	—	—	—
Plus 4½ UNITS ELECTIVES (technical and humanities) selected in consultation with the department before the end of second year.‡						

†Please refer to the statement headed "Humanities Elective Courses" above.
‡In 1986/87, STAT 251 will be taken in the Second Term in place of 1½ units of electives.

FOURTH YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
BIOE 461 (1½) Drainage Engineering	2	2	—	—	—	—
BIOE 462 (1½) Irrigation Engineering	—	—	—	2	2	—
BIOE 471 (1½) Systems Design I	2	2*	2*	—	—	—
BIOE 472 (1½) Systems Design II	—	—	—	2	2*	2*
BIOE 480 (1½) Energy and Mass Transport in Food Systems	2	2*	2*	—	—	—
BIOE 489 (1) Seminar	—	—	2*	—	—	2*
BIOE 490 (1½) Biomass Conversion and Utilization	2	2*	2*	—	—	—
BIOE 499 (3) Thesis	—	2	—	—	4	—
Plus 9 UNITS ELECTIVES selected in consultation with the department before the end of third year.						

*Alternate weeks.

2. Chemical Engineering

SECOND YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 278 (1½) Engineering Materials	3	2*	—	—	—	—
CHML 241 (1½) Mass & Energy Balances	3	—	1	—	—	—
CHML 242 (1) Chem. Proc. Technology	—	—	—	2	—	1
CHML 251 (1½) Transport Phen. I	—	—	—	3	—	2*
CHML 261 (½) Chem. Eng. Lab. I	—	—	—	—	4*	—
CHEM 250 (1) Inorganic Chemistry	—	—	—	2	—	—
CHEM 251 (1½) Physical Chemistry I	3	—	1*	—	—	—
CHEM 252 (1) Physical Chemistry II	—	—	—	2	—	1*
CHEM 255 (1) Chemistry Lab.	—	4	—	—	4	—
CHEM 260 (2) Organic Chemistry	2	—	—	2	—	—
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Eqns.	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Eqns.	—	—	—	3	—	—
†Humanities Elective (3)	3	—	—	3	—	—

*Alternate weeks.
†Please refer to the statement headed "Humanities Elective Courses" above.

THIRD YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
CHEM 352 (2) Analytical Chemistry	2	—	—	—	4	—
CHML 341 (1½) Diffusional Operations I	—	—	—	3	—	2*
CHML 345 (1) Applied Thermodynamics I	2	—	2*	—	—	—
CHML 346 (1) Applied Thermodynamics II	—	—	—	2	—	2*
CHML 351 (1½) Transport. Phenomena II	3	—	2*—	—	—	—
CHML 353 (1½) Mechanical and Thermal Operations	2	—	2*	—	—	—
CHML 356 (1½) Process Control	—	—	—	3	—	—
CHML 357 (1) Interfacial Phenomena	2	—	—	—	—	—
CHML 358 (1) Properties of Fluids	—	—	—	2	—	—
CHML 359 (1½) Chemical Engineering Economics	—	—	—	3	—	—
CHML 362 (1) Chemical Engineering Laboratory II	—	3	—	—	—	—
CHML 363 (1) Chemical Engineering Laboratory III	—	—	—	—	3	—
ELEC 263 (1½) Applied Electrical Circuits & Devices	2	2*	1	—	—	—
STAT 251 (1½) Elementary Statistics	3	—	—	—	—	—
Technical Elective (1)	—	—	—	2	—	—
†Humanities Elective (3)	3	—	—	3	—	—

*Alternate weeks.
†Please refer to the statement headed "Humanities Elective Courses" above.

FOURTH YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
CHML 450 (2) Diffusional Operations	2	—	2*	2	—	2*
CHML 453 (2) Economics of Plant Design	2	—	—	2	—	—
CHML 454 (3) Process Design Project	—	—	2	—	—	2
CHML 455 (3) Chem. Eng. Reactor Design..	2	—	—	2	4	—
CHML 458 (1) Properties of Fluids	2	—	—	—	—	—
CHML 460 (2) Chem. Eng. Laboratory	—	6	—	—	6*	—
CHML 498 (1½) Summer Essay	Summer task					
CHML 499 (4) Thesis	—	4	—	—	8	—
‡Electives, technical and general (6)	6	—	—	6	—	—

‡As part of the general Chemical Engineering program, a choice of electives is available within the department and in other departments and faculties. Guidance will be provided to students who wish to select Elective Groupings in an area of special interest such as process control, computer modelling and optimization, pollution control, pulp and paper, energy or biochemical engineering. Some electives may be taken in third year.
*Alternate weeks.

3. Civil Engineering

SECOND YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
CIVL 205 (1½) Municipal Water Supply and Waste Disposal	—	—	—	3	—	2
CIVL 215 (1½) Fluid Mechanics	3	—	2	—	—	—
CIVL 220 (1½) Civil Engineering Materials I	—	—	—	3	2*	—
CIVL 225 (1½) Computer Applications in Civil Engineering	—	—	—	1	3	—
CIVL 230 (1½) Solid Mechanics I	3	—	2	—	—	—
CIVL 231 (1½) Solid Mechanics II	—	—	—	3	—	2*
CIVL 232 (1½) Dynamics II	3	—	1	—	—	—
CIVL 235 (2) Plane Surveying	(At end of 2nd Term, 1st Year)					
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
PHYS 252 (1) Introduction to Electric and Magnetic Fields	2	—	1	—	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	—	—
†Humanities Electives (3)	3	—	—	3	—	—

†Please refer to the statement headed "Humanities Electives Courses" above.

THIRD YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
CIVL 300 (1½) Engineering Economic Analysis	3	2*	—	—	—	—
CIVL 301 (1½) Optimization and Decision Analysis in Civil Engineering	—	—	—	3	—	—
CIVL 310 (1½) Soil Mechanics I	3	2*	—	—	—	—
CIVL 311 (1½) Soil Mechanics II	—	—	—	3	2*	—
CIVL 315 (1½) Hydraulics I	2	2*	1	—	—	—
CIVL 316 (1½) Hydraulics II	—	—	—	2	2*	1
CIVL 320 (1½) Civil Engineering Materials II	3	2*	—	—	—	—
CIVL 321 (1) Laboratory Project in Engineering Materials	—	—	—	1	2	—

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3. Civil Engineering—Continued

CIVL 330 (1½) Structural Design I	—	—	—	3	—	2*
CIVL 332 (1½) Structural Analysis I	3	—	—	—	—	—
CIVL 333 (1½) Structural Analysis II	—	—	—	3	—	—
CIVL 340 (1½) Transportation Engineering I	—	—	—	3	—	2
MATH 257 (1½) Partial Differential Equations	3	—	—	—	—	—
Humanities Elective (1½)	3	—	—	—	—	—

* Alternate Weeks.
† Please refer to the statement headed "Humanities Elective Courses" above.

In the Fourth Year, selected groups of courses are offered representing interest areas in structures, municipal engineering, water and pollution, and materials and construction. Each program consists of a core which is common to all programs, and technical electives for the particular area.

All elective courses are subject to the approval of the Head of the Department.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
Common Core						
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
CIVL 466 (1) Water Resources Engineering	—	—	—	2	—	—
CIVL 472 (1½) Foundation Engineering I	3	—	—	—	—	—
CIVL 476 (1) Legal Aspects of Engineering	1	—	—	—	—	—
CIVL 490 (2) Construction Engineering	2	—	—	2	—	—
CIVL 495 (1) Decision Analysis in Civil Engineering	—	—	—	2	—	—
*Free electives (3)	3	—	—	3	—	—
†Technical Electives to bring course load to a minimum of 21 units.						

† Technical Electives are to be chosen in consultation with departmental advisers and approved by the Head of the Department.
* Any three units of courses in the University, including Civil Engineering, subject to prerequisites and approval of the Department.

4. Electrical Engineering

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
ELEC 251 (1) Circuit Analysis I	2	—	1	—	—	—
ELEC 252 (1½) Solid State Devices	2	2*	1	—	—	—
ELEC 253 (1½) Circuit Analysis II	—	—	—	2	2*	1
ELEC 254 (1½) Electronic Circuits I	—	—	—	2	2*	1
ELEC 256 (1½) Switching Circuits	2	2*	1	—	—	—
ELEC 258 (1) Computer Methods	2	—	1	—	—	—
ELEC 261 (1½) Engineering Electromagnetics	—	—	—	3	—	1
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Equations	—	—	—	3	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	—	—
Humanities Electives (3)	3	—	—	3	—	—

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
ELEC 352 (1½) Elect. Eng. Materials	—	—	—	2	2*	2*
ELEC 356 (1½) Electronic Circuits II	2	3*	2*	—	—	—
ELEC 358 (1½) Introduction to Microcomputers	—	—	—	2	3*	2*
ELEC 359 (1½) Signals and Communications	3	—	1	—	—	—
ELEC 360 (1½) Systems and Control	—	—	—	3	—	1
ELEC 362 (1) Appl. of Electromagnetic Fields	2	—	2*	—	—	—
ELEC 363 (1½) Guided Waves and Radiation	—	—	—	2	2*	2*
ELEC 371 (1½) Power Circuits and Devices	2	2*	1	—	—	—
ELEC 372 (1½) Rotating Machines	—	—	—	2	2*	1*
MATH 350 (1½) Complex Variables and Applications	3	—	—	—	—	—
OR						
†Humanities Elective (3)	3	—	—	3	—	—
Technical Elective (3) chosen from a list of courses made available by the Department	3	—	—	3	—	—

† Please refer to the statement headed "Humanities Elective Courses" above.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
ELEC 473 (3) Systems Lab.	—	6	—	—	6	—
ELEC 498 (1) Engineering Reports	—	—	—	—	—	—

† Free Electives
‡ Compatible Electives totalling 6 units.
A Technical Elective (usually 3 units) chosen from a list of courses made available by the Department.

* Alternate weeks.
† A minimum of four units of courses in the University, including Electrical Engineering, subject to prerequisites and time-table restrictions.
‡ Approved by the Department, and normally Electrical Engineering Courses.

Honours Mathematics Option:

It is possible for students in Electrical Engineering to complete, in addition to the Electrical Engineering Program, the basic Mathematics requirement of a combined Honours degree in Mathematics, by:

(1) replacing MATH 253 and 254 by MATH 225 and obtaining at least Second Class standing, OR by taking MATH 253 and 254 and obtaining First Class standing in both;
(2) taking MATH 220 if MATH 253 and 254 are not replaced by MATH 225 (recommended but not required);
(3) taking as electives in Third and Fourth Years: MATH 300 (instead of 350), 320, 400, plus three units chosen from MATH 322, 418, 420, 422, 423, 424, 425, 426.

Students who satisfactorily complete such a program, and obtain a minimum overall Second Class average in their Mathematics courses numbered 300 or higher, will be given recognition as receiving the B.A.Sc. in Electrical Engineering (Honours Mathematics Option).

Students interested in undertaking this program should consult Undergraduate Student Advisers in the Departments of Electrical Engineering and Mathematics.

Computer Engineering Option:

By taking a modified Electrical Engineering program and by consistently choosing suitable Computer Science courses as Technical and Free Electives, it is possible to complete the requirements of the Computer Engineering Option in Electrical Engineering. Students who satisfactorily complete the following program will be given recognition as receiving the B.A.Sc. in Electrical Engineering (Computer Engineering Option).

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CPSC 118 (1½) Principles of Computer Programming	3	—	2	—	—	—
CPSC 210 (1½) Computer Program Design I	—	—	—	3	—	—
ELEC 251 (1) Circuit Analysis I	2	—	1	—	—	—
ELEC 252 (1½) Introduction to Solid State Devices	2	2*	1	—	—	—
ELEC 253 (1½) Circuit Analysis II	—	—	—	2	2*	1
ELEC 254 (1½) Electronic Circuits I	—	—	—	2	2*	1
ELEC 256 (1½) Switching Circuits	2	2*	1	—	—	—
ELEC 261 (1½) Engineering Electromagnetics	—	—	—	3	—	1
ELEC 358 (1½) Introduction to Microcomputers	—	—	—	2	3*	2*
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—

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Computer Engineering Option—Continued

MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Equations	—	—	—	3	—	—
Humanities Elective (3)	3	—	—	3	—	—

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
ELEC 258 (1) Computer Methods	2	—	1	—	—	—
ELEC 356 (1½) Electronic Circuits II	2	3*	2*	—	—	—
ELEC 359 (1½) Signals and Communications	3	—	1	—	—	—
ELEC 362 (1) Applications of Electromagnetic Fields	2	—	2*	—	—	—
ELEC 371 (1) Power Circuits and Devices	2	3*	1	—	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	—	—
and three of the following four courses:						
ELEC 352 (1½) Electrical Engineering Materials	—	—	—	2	2*	2*
ELEC 360 (1½) Control Systems	—	—	—	3	—	1
ELEC 363 (1½) Guides Waves and Radiation	—	—	—	2	2*	1
ELEC 372 (1½) Rotating Machines	—	—	—	2	3*	1
Technical Electives:						
CPSC 310 (1½) Computer Program Design II	3	—	1	—	—	—
OR						
	—	—	—	3	—	—
CPSC 313 (1½) Systems Programming	3	—	1	—	—	—
OR						
	—	—	—	3	—	1
Humanities Elective (3)	3	—	—	3	—	—

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
ELEC 473 (3) Systems Laboratory	—	6	—	—	6	—
ELEC 498 (1) Engineering Report	—	—	—	—	—	—
ELEC 456 (1½) Computer Communications	3	—	1	—	—	—
ELEC 464 (1½) Micro/Minicomputer Design	2	—	2*	—	—	—
ELEC 476 / CPSC 413 (1½) Computer Architecture	—	—	—	3	—	1
CPSC 410 (1½) Introduction to Operating Systems I	3	—	—	—	—	—
Humanities Elective (1½)	3	—	—	—	—	—
OR						
	—	—	—	3	—	—

Remaining electives chosen as indicated below, to bring the total year load to the same as that of the regular Fourth Year Electrical Engineering curriculum.

Fourth Year Electives — Computer Engineering Option

The following is a list of suggested elective courses. Other courses may be substituted with the approval of the Department Head.

ELEC 455 (3) Communication Systems
ELEC 466 (1½) Digital Signal Processing Systems
ELEC 468 (1½) Digital Process Control
ELEC 477 (3) Solid State Devices
ELEC 478 (1½) Introduction to Computer Graphics
CPSC 311 (1½) Definition of Programming Languages
CPSC 312 (1½) Symbolic Computing
CPSC 319 (1½) Introduction to Compiler Construction
CPSC 322 (1½) Introduction to Artificial Intelligence
CPSC 404 (1½) Introduction to Database Management Systems
CPSC 415 (1½) Introduction to Operating Systems II
CPSC 422 (1½) Intelligence Systems

For Engineering students, Computer Science 220 is a recommended but not required prerequisite for those Computer Science courses such as Computer Science 311, 312 and 319 that normally specify Computer Science 220 as a prerequisite.

Admission into the Computer Engineering Option in the second year will be limited and will require at least a Second Class standing in first year Applied Science and also in Computer Science 151. Interested students should consult the Undergraduate Student Adviser in Electrical Engineering before registering in Second Year Applied Science.

Admission into the Third Year of the Computer Engineering Option requires prior completion of Computer Science 118 and 210 or equivalent with at least a Second Class standing in each and not less than an overall Second Class average in Second Year. Students who have completed the requirements of the Second Year of the Computer Engineering Option but who do not meet the academic standards for admission into the Third Year of the Option will be able to revert to the regular Electrical Engineering program.

5. Geological Engineering

Geological Engineering is an interdisciplinary program under the jurisdiction of the Dean of the Faculty of Applied Science and administered by a Board of Study.

Enquiries regarding the program and student advising should be made through Dr. Colin Godwin, Acting Director, Geological Engineering (Room 161, Department of Geological Sciences, phone: 228-8404).

In the third and fourth years, students can choose their programs from one of three options:

Option I — Minerals and Fuels (A: Minerals; B: Petroleum, Coal)
Option II — Applied Geophysics
Option III — Geotechnical

Students in Option I are given the choice in fourth year of Option IA which focusses on mineral exploration and development, or Option IB which concentrates on hydrocarbon exploration and production. Option II is for those interested in the application of geophysics to mineral or petroleum exploration or to civil engineering. Applications of mathematics and physics are emphasized in Option II. Option III is a common choice for those interested in the applications of geology to water resources, foundation engineering and construction.

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CIVL 235 (2) Plane Surveying	At end of 2nd Term, 1st year					
APSC 278 (1½) Engineering Materials[1]	3	2*	—	—	—	—
OR						
GEOL 150 (1½) Earth Science[1]	3	2	—	—	—	—
GEOL 200 (1½) Mineralogy I	2	3	—	—	—	—
GEOL 201 (1½) Optical Mineralogy	—	—	—	2	3	—
GEOL 256 (1½) Stratigraphy and Sedimentology	—	—	—	2	2	—
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Equations	—	—	—	3	—	—
MECH 260 (1½) Introduction to Mechanics of Materials	3	—	1	—	—	—
MECH 280 (1½) Introduction to Fluid Mechanics	—	—	—	3	—	2*
MMPE 201 (1) Introduction to Mining	2	3*	—	—	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	—	—
†Humanities Elective (3)	3	—	—	3	—	—

[1] If GEOL 150 was taken in 1st year, take APSC 278. If GEOL 150 was not taken in 1st year, take GEOL 150 and take APSC 278 as an elective in 3rd or 4th year.
† Please refer to the statement headed "Humanities Elective Courses" above.
* Alternate weeks.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CIVL 336 (2) Applied Plane Surveying	AT END OF 2nd YEAR					
GEOL 302 (1½) Igneous Petrology	2	3	—	—	—	—
GEOL 304 (3) Structural Geology	2	3	—	2	3	—
GEOL 392 (1½) Groundwater Hydrology	2	2	—	—	—	—
Technical Elective(s) (3)	3	—	—	3	—	—
Humanties Elective(s) (3)	3	—	—	3	—	—
OPTION I (Minerals and Fuels) and OPTION III (Geotechnical)						
CIVL 310 (1½) Soil Mechanics I	3	2*	—	—	—	—
CIVL 311 (1½) Soil Mechanics II	—	—	—	3	2*	—
GEOL 303 (1½) Metamorphic Petrology	—	—	—	2	3	—

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5. Geological Engineering—Continued

GEOL 305 (1½) Interpretation of Aerial Photographs	—	—	—	2	3	—
GEOL 351 (1½) Geomorphology	2	2	—	—	—	—
MMPE 303 (1) Rock Properties	2	2	—	—	—	—
OPTION II (Applied Geophysics)						
GEOL 368 (1½) Mineral Exploration and Preliminary Feasibility Studies	2	2	—	—	—	—
GEOP 320 (1½) Introduction to Theoretical Geophysics	3	—	—	—	—	—
GEOP 321 (1½) Seismology	—	—	—	3	3*	—
GEOP 322 (1½) Time Series Analysis in Geophysics	3	—	1	—	—	—
MATH 357 (1½) Engineering Analysis[1]	—	—	—	3	—	2*
PHYS 251 (2) Electric and Magnetic Fields	3	3	1	—	—	—

* Alternate weeks.
† Please refer to the statement headed "Humanities Elective Courses" above.
[1] MATH 350 (1½) Complex Variables, may be substituted for MATH 357.

FOURTH YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
GEOL 435 (1½) Field Geology	at end of 3rd Year					
OPTION IA (Minerals)						
GEOL 303 (1½) Metamorphic Petrology	—	—	—	2	3	—
GEOL 418 (3) Mineral Deposits	2	2	—	2	2	—
GEOL 428 (1½) Sulphide Mineralogy and Mineralography	2	3	—	—	—	—
GEOL 499 (3) Thesis	—	3	—	—	3	—
GEOP 400 (3) Applied Physics of the Earth	2	2	—	2	2	—
MMPE 452 (1½) Mineral Economics & Mine Valuation	—	—	—	3	—	2
MMPE 457 (1) Introduction to Rock Mechanics	2	2*	—	—	—	—
See footnote 1 concerning additional electives.						
OPTION IB (Petroleum, Coal)						
GEOL 321 (1½) Paleontology I	2	2	—	—	—	—
GEOL 406 (1½) Advanced Sedimentology	2	2	—	—	—	—
GEOL 416 (1½) Carbonate-Chert Sedimentology	—	—	—	2	2	—
GEOL 418 (3) Mineral Deposits[2]	2	2	—	2	2	—
GEOL 421 (1½) Paleontology II	—	—	—	2	3	—
GEOL 499 (3) Thesis	—	3	—	—	3	—
GEOP 400 (3) Applied Physics of the Earth	2	2	—	2	2	—
MMPE 452 (1½) Mineral Economics & Mine Valuation	—	—	—	3	—	2
See Footnote 1 concerning additional electives.						
OPTION II (Applied Geophysics)						
GEOL 368 (1½) Mineral Exploration & Preliminary Feasibility Studies	2	2	—	—	—	—
GEOL 452 (1) Geotechnical Engineering Practice	—	—	—	2	—	—
GEOL 462 (1½) Principles of Geological Engineering	2	—	2	—	—	—
GEOL 472 (1) Applied Structural Geology in Geotechnical Engineering	—	—	—	2	—	—
GEOP 420 (1½) Potential Methods	3	—	—	—	—	—
GEOP 421 (1½) Applied Geophysical Laboratory	1*	3	—	1*	3	—
GEOP 426 (1½) Advanced Physics of the Earth	—	—	—	3	—	—
GEOP 499 (3) Thesis	—	3	—	—	3	—
MATH 357 (1½) Engineering Analysis[3]	—	—	—	3	—	2*
MMPE 452 (1½) Mineral Economics and Mine Valuation	—	—	—	3	—	2
See footnote 1 concerning additional electives.						
OPTION III (Geotechnical)						
CIVL 472 (1½) Foundation Engineering I	3	—	—	—	—	—
CIVL 473 (1) Foundation Engineering II	—	—	—	1	—	1
CIVL 476 (1) Legal Aspects of Engineering	1	—	—	—	—	—
GEOL 351 (1½) Geomorphology	2	2	—	—	—	—
GEOL 452 (1) Geotechnical Engineering Practice	—	—	—	2	—	—
GEOL 462 (1½) Principles of Geological Engineering	2	—	2	—	—	—
GEOL 472 (1) Applied Structural Geology in Geotechnical Engineering	—	—	—	2	—	—
GEOL 499 (3) Thesis	—	3	—	—	3	—
GEOP 400 (3) Applied Physics of the Earth	2	2	—	2	2	—
MMPE 457 (1) Introduction to Rock Mechanics	2	2*	—	—	—	—
See footnote 1 concerning additional electives						

* Alternate weeks.
[1] All options require additional electives to bring the total course load to approximately 26 hours/week, selected in consultation with the Program Director, Geological Engineering.
[2] GEOL 368, Mineral Exploration, and GEOL 436, Sedimentary Basin Analysis, may be substituted for GEOL 418.
[3] MATH 350 (1½) Complex Variables, may be substituted for MATH 357.

6. Mechanical Engineering

SECOND YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 278 (1½)Engineering Materials	3	2*	—	—	—	—
ELEC 263 (1½) Applied Electrical Circuits and Devices	—	—	—	2	2*	1
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MECH 250 (1½) Engineering Drawing & Computer Graphics	1	3	—	—	—	—
MECH 260 (1½) Introduction to Mechanics of Materials	3	—	1	—	—	—
MECH 265 (1½) Rigid Body Dynamics	—	—	—	3	—	1
MECH 270 (1) Principles of Energy Conversion	—	—	—	2	—	—
MECH 280 (1½) Introduction to Fluid Mechanics	—	—	—	3	—	2*
MECH 290 (1½) Manufacturing Processes	—	—	—	1	3	—
PHYS 252 (1) Introduction to Electric and Magnetic Fields	2	—	1	—	—	—
†Humanities Elective (3)	3	—	—	3	—	—

* Alternate weeks.

THIRD YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
ELEC 365 (1½) Applied Electronics	—	—	—	2	2*	2*
MATH 257 (1½) Partial Differential Equations	3	—	—	—	—	—
MATH 357 (1½) Engineering Analysis	—	—	—	3	—	2*
MECH 350 (1½) Engineering Design	2	—	2	—	—	—
MECH 355 (1½) Instruments & Measurements	2	3	—	—	—	—
MECH 360 (1½) Mechanics of Materials I	—	—	—	3	—	—
MECH 365 (1½) Machine Dynamics and Vibrations	3	—	—	—	—	—
MECH 370 (1) Engineering Thermodynamics	2	—	1	—	—	—
MECH 371 (½) Thermodynamics and Heat Transfer Laboratory	—	—	—	—	3*	—
MECH 375 (1) Heat Transfer I	—	—	—	2	—	1
MECH 380 (2) Fluid Dynamics	—	—	—	3	2*	—
MECH 390 (1½) Engineering Data Analysis	3	—	—	—	—	—
MECH 391 (1½) Industrial Systems	—	—	—	3	—	—
MECH 398 (1) Engineering Report	—	—	2	—	—	—
†Humanities Elective (3)	3	—	—	3	—	—

* Alternate weeks.
**Report outline due on or before registration.
† Please refer to the statement headed "Humanities Elective Courses" above. If ECON 100 has not already been taken, students should take ECON 309.

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6. Mechanical Engineering—Continued

FOURTH YEAR

Students pre-register for Fourth Year courses with a faculty adviser towards the end of the Third Year. Each student takes 11½ units as a core in the Fourth Year, and chooses 10 or 11 units of Electives with the help of an adviser.

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
MECH 460 (1½) Mechanics of Materials II	—	—	—	3	—	—
MECH 463 (3) Mechanical Design	2	—	3	2	—	3
MECH 465 (1½) Dynamics II	3	—	—	—	—	—
MECH 466 (1½) Automatic Control	—	—	—	3	—	—
MECH 470 (1½) Thermal Power Generation	2	—	1	—	—	—
MECH 472 (2) Project and Design Laboratory	—	3	—	—	3	—
MECH 475 (1½) Heat Transfer II	—	—	—	2	—	1
†ELECTIVES						
CPSC 350 (1) Programming of Numerical Algorithms	2	—	1	—	—	—
MATH 400 (3) Applied Analysis II	3	—	—	3	—	—
METL 475 (2) Fabrication of Metals	2	—	—	2	—	—
MECH 440 (3) Stability Design Arrangements for Ships#	3	—	1	3	—	1
MECH 441 (3) Ship Hydromechanics#	3	—	1	3	—	1
MECH 455 (1) Hydrodynamic Lubrication	2	—	—	—	—	—
MECH 456 (1) Boundary Lubrication	—	—	—	2	—	—
MECH 458 (2) Industrial Engineering	2	—	1	2	—	1
MECH 467 (1½) Advanced Dynamics	—	—	—	3	—	—
MECH 473 (1½) Heating, Ventilating and Air Conditioning	3	—	—	—	—	—
MECH 474 (1) Solar Energy Utilization	2	—	1	—	—	—
MECH 477 (1) Nuclear Energy Conversion	2	—	—	—	—	—
MECH 481 (3) Aerodynamics of Aircraft	3	1*	—	3	1*	—
MECH 482 (1½) Wind Engineering	—	—	—	3	—	—
MECH 491 (2) Industrial Management	2	—	—	2	—	—
‡Approved Electives						

* Alternate weeks.

† Some electives may not be offered in a given year.

‡ As electives, suitable undergraduate or graduate courses outside of the Department or graduate courses in the Department may be chosen up to a total of 3 units, subject to the approval of the Department.

\# Students wishing specialization in Naval Architecture are advised to include MECH 440 and MECH 441 in their electives.

Naval Architecture Option

By taking the following modified program in Third and Fourth Years, students can complete the requirements of the Naval Architecture Option in Mechanical Engineering:

(1) Third Year: Defer ELEC 365 to Fourth Year; add MECH 340 and 341; MECH 371 is not taken;

(2) Fourth Year: Replace MECH 460, 466, 475 by MECH 440, 441, 442; only 1.5 units of technical electives are taken. (effective 1987-88)

Students who satisfactorily complete this program will be given recognition as receiving the B.A.Sc. in Mechanical Engineering (Naval Architecture Option).

7. Metallurgical Engineering

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 278 (1½) Engineering Materials	3	2*	—	—	—	—
CHML 251 (1½) Transport Phenomena I	—	—	—	3	—	2*
ELEC 263 (1½) Applied Electrical Circuits and Devices	2	2*	1	—	—	—
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Equations	—	—	—	3	—	—
MECH 260 (1½) Introduction to Mechanics of Materials	3	—	1	—	—	—
METL 252 (2) Metallurgical Engineering Processes	—	—	—	3	3*	—
METL 262 (1) Metallurgical Process Calculations I	1	—	2	—	—	—
METL 264 (1) Metallurgical Process Calculations II	—	—	—	1	3*	2
STAT 251 (1½) Elementary Statistics	—	—	—	3	—	—
†Humanities Electives (3)	3	—	—	3	—	—

7. Metallurgical Engineering—Fourth Year—Continued

†Please refer to the statement headed "Applied Humanities Electives" above.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
METL 350 (1½) Met. Thermodynamics I	—	—	—	3	—	—
METL 352 (2) Process Metallurgy	2	3	—	—	—	—
METL 360 (1) Heat Transfer	2	—	—	—	—	—
METL 362 (1) Mass Transfer	—	—	—	2	—	—
METL 370 (1½) Structure of Metals I	3	—	—	—	—	—
METL 374 (1½) Deformation Processes	—	—	—	2	3*	—
METL 376 (2) Structure and Properties of Steel	3	3*	—	—	—	—
METL 378 (1½) Phase Transformation and Solidification	—	—	—	3	—	—
METL 382 (1½) Non-Metallic Materials I	—	—	—	2	3	—
METL 390 (½) Seminar I	—	—	1	—	—	1
METL 398 (1) Engineering Report	—	—	—	—	—	—
MMPE 231 (1) Introduction to Mineral Processing	—	—	—	2	—	—
†Humanities Elective (3)	3	—	—	3	—	—

Plus 3½ units of electives approved by the Department.

† Please refer to the statement headed "Humanities Elective Courses" above. Information regarding prerequisites for fourth year courses will be provided during registration.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
Core Content:-						
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
METL 450 (2) Metallurgical Thermodynamics II	3	—	2	—	—	—
METL 456 (1) Corrosion Engineering	2	—	—	—	—	—
METL 462 (1) Process Modelling	2	—	—	—	—	—
METL 470 (1) Engineering Alloys	—	—	—	2	—	—
METL 472 (1½) Welding and Joining	2	3*	—	—	—	—
METL 476 (1) Casting of Metals	—	—	—	2	—	—
METL 480 (1) Fracture	2	—	—	—	—	—
METL 490 (½) Seminar II	—	—	1	—	—	1
METL 495 (1½) Metallurgical Laboratory	—	—	—	—	5	—
METL 498 (1) Engineering Report	—	—	—	—	—	—
METL 499 (1½) Research or Design Project	—	3	—	—	3	—
Plus 8½ units of approved electives with at least 4 units selected from the following list of Metallurgical Engineering electives:						
METL 452 (1) Iron and Steelmaking	2	—	—	—	—	—
METL 454 (1) Reactive Metal Processing	—	—	—	2	—	—
METL 458 (1) Hydrometallurgy	—	—	—	2	—	—
METL 464 (1) Energy and Fuels	2	—	—	—	—	—
METL 466 (1) Metallurgical Engineering Economics	—	—	—	2	—	—
METL 468 (1) Thermodynamic Problems	—	—	—	1	—	2
METL 478 (1) Electron Theory of Solids	—	—	—	2	—	—
METL 482 (1½) Non Metallic Materials II	—	—	—	3	—	—
METL 484 (1) Refractory Practice and Problems in Metallurgical Industries	2	—	—	—	—	—
METL 486 (1) Nuclear Materials	—	—	—	2	—	—
METL 488 (1) Strengthening in Alloy Systems	2	—	—	—	—	—
METL 492 (1) Powder Metallurgy	2	—	—	—	—	—
METL 494 (1) Composite Materials I	2	—	—	—	—	—

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8. Mining and Mineral Process Engineering

SECOND YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 278 (1½) Engineering Materials	3	2*	—	—	—	—
CHEM 262 (1½) Physical Chemistry of Surfaces	—	—	—	3	—	—
CIVL 215 (1½) Fluid Mechanics	3	—	2	—	—	—
CIVL 230 (1½) Solid Mechanics I	3	—	2	—	—	—
CIVL 235 (2) Plane Surveying	End of 2nd Term, 1st Year					
ELEC 263 (1½) Applied Electric Circuits & Devices	—	—	—	2	2*	1
GEOL 308 (1½) Introd. to Mineralogy and Petrology	2	2	—	—	—	—
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Equations	—	—	—	3	—	—
MMPE 201 (1) Introd. to Mining	2	3*	—	—	—	—
MMPE 231 (1) Introd. to Mineral Processing	—	—	—	2	—	—
PHYS 252 (1) Introd. to Electric & Magnetic Fields	2	—	1	—	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	—	—
†Humanities Elective (1½)	3	—	—	—	—	—
OR	—	—	—	3	—	—

* Alternate weeks.

THIRD YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
CIVL 336 (2) Surveying	—	—	(end of 2nd Term, 2nd Year)			
GEOL 354 (1½) Structural Geology	2	3	—	—	—	—
GEOL 368 (1½) Mineral Exploration and Mining Geology	2	2	—	—	—	—
MMPE 300 (1½) Basic Mining Methods and Equipment I	3	3*	—	—	—	—
MMPE 301 (2) Basic Mining Methods and Equipment II	3	3	—	—	—	—
MMPE 303 (1) Rock Properties	2	2	—	—	—	—
MMPE 304 (1) Rock Fragmentation	—	—	—	2	—	—
MMPE 331 (2) Unit Operations I	3	3	—	—	—	—
MMPE 332 (1) Unit Operations II	—	—	—	2	3*	—
MMPE 333 (1) Flotation	—	—	—	2	3	—
MMPE 391 (1) Capital and Operating Cost Estimation	—	—	—	2	—	—
MMPE 392 (1) Materials Handling	—	—	—	2	—	3*
MMPE 393 (½) Seminar	—	—	1	—	—	1
MMPE 394 (1) Engineering Report	—	—	—	—	—	—
MMPE 395 (1) Computer Applications in Mining & Mineral Processing	2	—	1	—	—	—
Humanities (3)	3	—	—	3	—	—

* Alternate weeks.
† Please refer to the statement headed "Humanities Elective Courses" above.

FOURTH YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
METL 372 (1) Physical Metallurgy	2	—	—	—	—	—
MMPE 410 (1) Systems Analysis I	2	—	1	—	—	—
MMPE 411 (1) Systems Analysis II	—	—	—	2	—	1
MMPE 412 (½) Capital and Operating Cost Estimations	1	—	—	—	—	—
MMPE 450 (1) Design Project Synthesis	1	—	2	—	—	—
MMPE 451 (2½) Mine Services	3	3	—	—	—	—
MMPE 452 (1½) Mineral Economics and Mine Valuation	3	—	2	—	—	—
MMPE 470 (1) Auxiliary Operations	2	—	—	—	—	—
MMPE 480 (2) Engineering Report	—	—	1	—	6	—
MMPE 490 (½) Seminar	—	—	1	—	—	1
MMPE 499 (½) Field Trip	—	—	—	—	—	—
Mining Option:						
MMPE 454 (2) Mine Design, Maintenance and Operation	—	—	—	2	—	3
MMPE 455 (1) Rock Behaviour	2	—	—	—	—	—
MMPE 456 (1) Rock Mechanics	—	—	—	2	—	—
MMPE 473 (1) Coal Mining Technology	—	—	—	2	—	—
†Plus a minimum of 4½ units of electives						
Mineral Processing Option:						
MMPE 460 (2) Plant Design, Maintenance and Operation	—	—	—	2	—	3
MMPE 465 (1) Control of Mineral Processes	—	—	—	2	—	—
MMPE 471 (1½) Surface Properties	2	3	—	—	—	—
MMPE 475 (1½) Coal Preparation Technology	2	3*	—	—	—	—
†Plus a minimum of 3½ units of electives						

* Alternate weeks.
† Electives chosen in consultation with the department before the commencement of Fourth Year.

9. Engineering Physics

Engineering Physics is a program under the jurisdiction of the Dean of the Faculty of Applied Science and administered by the Department of Physics. All enquiries regarding the program and student advising should be made through Dr. E. G. Auld; Program Director, Engineering Physics, Hennings Building.

The completion of a B.A.Sc. degree in Engineering Physics will normally take five years of university study. There are two main routes to achieve this goal: the "Direct" and "Transfer" routes.

The "Direct" route is for students who enter First Year Applied Science directly from Grade 12. Having completed First Year Applied Science, the student must then complete four years in the Engineering Physics program as described below.

The "Transfer" route is for students who have completed First Year Science or the equivalent before entering the Faculty of Applied Science. They will take a modified version of First Year Applied Science that is somewhat more advanced than the standard First Year (please see, under FIRST YEAR, the "Typical Transfer Program Following First Year Science"). After completion of this year, the student will then be required to complete three years in the "Transfer" route of the Engineering Physics Program. If you are considering entering this Program via the "Transfer" route, you are advised to consult with the Program Director to ensure the transferability of any course credits that you may have.

SECOND YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
CPSC 118 (1½) Principles of Computer Programming	3	—	2	—	—	—
ELEC 251 (1) Circuit Analysis I	2	—	1	—	—	—
ELEC 252 (1½) Solid State Devices	2	2*	1	—	—	—
ELEC 253 (1½) Circuit Analysis II	—	—	—	2	2*	1
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Equations	—	—	—	3	—	—
MECH 265 (1½) Rigid Body Dynamics	—	—	—	3	—	1
MECH 280 (1½) Introd. to Fluid Mechanics	—	—	—	3	—	2*
PHYS 250 (2) Introd. to Modern Physics	—	—	—	3	3	1
†Humanities Elective (3)	3	—	—	3	—	—

THIRD YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
Core						
APSC 278 (1½) Engineering Materials	3	2*	—	—	—	—
ELEC 254 (1½) Electronic Circuits I	—	—	—	2	2*	1
MATH 300 (3) Applied Analysis	3	—	—	3	—	—
MATH 362 (1½) Linear Algebra	—	—	—	3	—	—

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9. Engineering Physics—Continued

**PHYS 350 (1) Quantum Mechanics I	—	—	—	2	—	—
**PHYS 351 (1½) Applied Electromagnetic Theory	3	—	2	—	—	—
PHYS 251 (2) Int. to Elect. & Magn.	3	3	1	—	—	—
PHYS 352 (1) Phys. Lab.	—	—	—	—	3	—
**PHYS 398 (1) Technical Report	—	—	—	—	—	—
STAT 251 (1½) Statistics	—	—	—	3	—	—
†Humanities Elective (3)	3	—	—	3	—	—
Choose one of the following Options:						
OPTION A						
CPSC 210 (1½) Comp. Prog. Design I	3	—	—	—	—	—
CPSC 213 (1½) Comp. Sys. Struct.	—	—	—	3	—	—
ELEC 256 (1½) Switching Circuits	2	2*	1	—	—	—
**ELEC 356 (1½) Electronic Circuits II	2	3*	2*	—	—	—
OPTION B						
**ELEC 366 (2) Electronics Theory & Applications	—	—	—	3	2*	2*
MECH 250 (1½) Eng. & Comp. Graph	1	3	—	—	—	—
MECH 260 (1½) Int. to Mech. of Mat.	3	—	1	—	—	—
MECH 270 (1) Princ. of Energy Conv.	—	—	—	2	—	1
**METL 376 (1½) Structure & Properties of Steel	3	—	—	—	—	—

* Alternate weeks.

**NOTE: In 1986/87, Third Year Curriculum may be amended as follows: PHYS 350 deleted; PHYS 351 and 398 moved to Fourth Year; ELEC 356 (Option A) moved to Fourth Year; ELEC 366 and METL 376 (Option B) moved to Fourth Year.

† Please refer to the statement headed "Humanities Elective Courses" above.

FOURTH YEAR

Subject	First Term Lect.	First Term Lab.	First Term Prob.	Second Term Lect.	Second Term Lab.	Second Term Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
APSC 459 (3) Engineering Physics Projects I	—	5	1	—	5	1
MATH 400 (3) Applied Analysis II	3	—	—	3	—	—
PHYS 453 (2) Applied Nuclear Physics	3	—	—	—	—	1*
PHYS 454 (1½) Applied Solid State Phys.	—	—	—	3	—	—
PHYS 456 (1½) Applications of Classical Mech.	3	—	—	—	—	—
PHYS 458 (2) Applied Optics	2	3*	—	1	3*	—
‡A 1½-unit free elective						
**One of the following options:						
1. ELEC 358 (1½) Introduction to Microcomputers	—	—	—	2	3*	2*
and three of						
ELEC 370 (2) Electrical Machines and Power Transmission	—	—	—	2	2*	2*
ELEC 455 (2) Communication Systems	2	—	2*	2	—	2*
ELEC 460 (1) Control Systems	2	—	2*	—	—	—
ELEC 461 (1) Non-Linear and Optimum Systems	—	—	—	2	—	2*
ELEC 469 (2) Microwave Engineering	2	—	2*	2	—	2*
ELEC 483 (1) Antennas and Propagation	2	—	2*	—	—	—

9. Engineering Physics—Fourth Year—Continued

2. MECH 365 (1½) Machine Dynamics and Vibrations	3	—	—	—	—	—
MECH 370 (1) Eng. Thermodynamics	2	—	1	—	—	—
and one of						
MECH 463 (3) Mechanical Design	2	—	3	2	—	3
MECH 481 (3) Aerodynamics of Aircraft	3	1*	—	3	1*	—
3. METL 378 (1½) Phase Transformation and Solidification	—	—	—	3	—	—
METL 470 (1) Engineering Alloys	—	—	—	2	—	—
METL 495 (1½) Metallurgical Lab.	—	—	—	—	5	—
and three of:						
METL 472 (1½) Welding and Joining	2	3*	—	—	—	—
METL 474 (1) Mechanical Working	—	—	—	2	—	—
METL 476 (1) Casting of Metals	—	—	—	2	—	—
METL 480 (1) Fracture	2	—	—	—	—	—
METL 486 (1) Nuclear Materials	—	—	—	2	—	—
METL 488 (1) Strengthening in Alloy Systems	2	—	—	—	—	—
METL 492 (1) Powder Metallurgy	2	—	—	—	—	—
4. GEOP 321 (1½) Seismology	—	—	—	3	3*	—
GEOP 420 (1½) Potential Methods	3	—	—	—	—	—
ELEC 358 (1½) Introduction to Microcomputers	—	—	—	2	3*	2*
ELEC 460 (1) Control Systems	2	—	2*	—	—	—
ELEC 461 (1) Non-Linear and Optimum Systems	—	—	—	2	—	2*
METL 464 (1) Energy and Fuels	2	—	—	—	—	—
5. CPSC 210 (1½) Computer Program Design I	3	—	—	—	—	—
and						
CPSC 213 (1½) Computer Systems Structures	—	—	—	3	—	—
or						
CPSC 302 (3) Numerical Computation I	3	—	—	3	—	—
ELEC 358 (1½) Introduction to Microcomputers	—	—	—	2	3*	2*
ELEC 460 (1) Control Systems	2	—	2*	—	—	—
ELEC 461 (1) Non-Linear and Optimum Systems	—	—	—	2	—	2*
6. OCGY 308 (1½) Intro. to Oceanography I	3	—	—	—	—	—
OCGY 309 (1½) Intro. to Oceanography II	—	—	—	3	—	—
CIVL 447 (1) Coastal Engineering	2	—	—	—	—	—
ELEC 358 (1½) Introduction to Microcomputers	—	—	—	2	3*	2*
ELEC 460 (1) Control Systems	2	—	2*	—	—	—
ELEC 461 (1) Non-Linear and Optimum Systems	—	—	—	2	—	2*

* Alternate weeks.

‡ Suitable undergraduate or graduate courses outside of the Engineering Physics Program may be chosen subject to the approval by the Program Director. The elective may be increased to 3 units by substituting for one of the Applied Physics Courses: Physics 453, 454, 456 or 458.

**The Engineering Physics Program is accredited by the Association of Professional Engineers. However, Engineering Physics students are expected to correlate their technical electives with a particular technical field.

1986/87

THE SCHOOL OF ARCHITECTURE

(A School within the Faculty of Applied Science)

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PATRICIA PATKAU, B.A., B.E.S., B.Arch (Manitoba)

THE SCHOOL OF ARCHITECTURE

Architecture is one of several professions concerned with man's environment: the architect is educated to understand and participate in the design of the built environment. As an academic discipline, architecture relates the humanities, sciences, technology and the creative arts. To create architecture makes demands upon a sound academic background and an ability in the realm of creative problem solving. It is essential therefore that all students entering the School of Architecture be academically mature and that they possess an imaginative outlook. Thus the School selects students from a variety of disciplines upon which to build architectural understanding and competence. The education offered is at a graduate level; the degree awarded is a Bachelor of Architecture.

The School presents opportunities for (a) entrance into the profession of architecture; (b) the pursuit of specialized and related fields of applied knowledge; and, (c) the opportunity for continued education at a graduate level in architecture or an associated discipline.

The tasks undertaken by the architect today embrace areas not previously of professional concern. Thus, as part of their work of design, architects now assist in the preparation of feasibility studies, programming for building, urban design, the development of building systems and the analysis of the building needs of the community. They are also called upon to predict the efficiency and performance of materials used in building, and are expected to know the effect of their buildings upon people and social customs. These demands call into being new areas of research in which the physical, social and behavioural sciences and the humanities are involved. Thus, the School brings together in its faculty not only architects, but building scientists, engineers, a social psychologist and others offering courses in architecture and related disciplines.

The course is of three years' duration for students in full-time attendance during Winter Session; students studying on a part-time basis will need more than three years to fulfil degree requirements. Students may be advised to interrupt their academic studies at the end of First or Second Year for a prescribed period in order to experience conditions in practice, or take part in construction work, or to travel in countries outside Canada.

When appropriate arrangements can be made, the School will offer a Study Abroad program whereby approximately 20 second- or third-year students will travel to a selected location and, under the direction of faculty from this School and the host country, will undertake a full term's work, including design tutorials, lectures, and field trips. These programs require planning well in advance of the leaving date, and every effort is made to give the students adequate lead time to make their own arrangements. Students interested in participating in this unique program must be prepared to meet the considerable extra expenses involved.

Opportunities for postgraduate studies in Architecture and related fields are available at the University of British Columbia and at other institutions. For information on postgraduate studies at the University of British Columbia, reference should be made to the Faculty of Graduate Studies section of the calendar.

Admission

The Admissions Committee of the School of Architecture requires that students entering the program should demonstrate interest and potential in the broad field of the creative arts and architecture. Prior instruction and experience in the arts, crafts, or other design oriented activities, with emphasis on visual communication in various media, is extremely valuable. Similarly the selection of university courses covering a broad range of studies in the Arts, Humanities and Social Sciences on the one hand and the Physical and Applied Sciences on the other, offers a desirable breadth and mix of academic experience. Irrespective of specific degree requirements within various faculties or universities, the School of Architecture considers it desirable that entering students have completed university-level course-work in Mathematics (including introductory calculus), English literature and composition, and a survey course in Architectural History.

For students seeking general information and guidance in preparation for entry to the School a note entitled "Information for Prospective Students" is available on request at the School office. Prospective students are encouraged to establish contact with the School during their pre-architecture years by arranging for interviews and counselling with faculty, by attendance at public presentations of student work, and by informal contact with students and recent graduates and participation in student-sponsored activities.

The academic requirements for admission to the School of Architecture are:

1. Completion of a baccalaureate degree at the University of British Columbia, or at another recognized college or university, following a broadly based program of studies in:
   (a) the Arts, Social Sciences, Humanities, and/or,
   (b) the Physical and Applied Sciences,

   An average of not less than 65% or its equivalent is required in the courses comprising the final two years of study leading to the degree.

OR

2. Successful completion of at least three years of an approved program of study with second class standing (65%) at a School of Architecture in Canada or at a School of Architecture listed in one of the following accreditation lists of recent date:
   (a) Schools of Architecture recognized by the Commonwealth Association of Architects (C.A.A.),
   (b) Schools of Architecture recognized by the Royal Institute of British Architects (R.I.B.A.) in the United Kingdom and in European Common Market countries,
   (c) Schools of Architecture listed by the National Architecture Accrediting Board (N.A.A.B.) in the United States,

OR

3. Completion of an approved diploma course in Building Technology of at least two years duration at the post secondary level, plus not less than three years of study at the college or university level as outlined in (1) above.

Applicants not meeting the specific academic requirements given in (1), (2) or (3) above but who possess extensive experience in design-related activities, or who consider that their background is of equal merit, may apply to the Registrar for a review of their academic standing so that their application may be considered by the Admissions Committee of the School. Applicants in this category must specify this intention in their application and must demonstrate that their experience and accomplishments relevant to architecture will compensate for any deficiencies in their academic record.

Application for admission to the School of Architecture as a candidate for the degree of Bachelor of Architecture must be made through the School on the appropriate forms (available from the School Office). The Admissions Committee is concerned about the aptitude of applicants for the study of architecture together with their demonstrated creative potential. Assessment of each application is made upon the basis of all six elements of the submission as listed below. All parts of the application are to be completed and submitted to the School of Architecture no later than APRIL 1 (with the exception of Items 2 and 4, as noted):

1. Application form. Applicants must submit an application on the form entitled, "Application for Admission to the School of Architecture", together with a general "Application for Admission or Application for Readmission" form of the University of B.C.
2. Academic transcripts. Two (2) official transcripts of all post-secondary study (university/college), indicating degree awarded.
   If the applicant is currently completing a degree, a *first set of two (2) official transcripts* of all post-secondary study completed to date, including mid-year (December) grades should accompany the application or be forwarded to the School *not later than APRIL 1*. A preliminary evaluation will be made on these transcripts and if such an applicant is accepted into the B.Arch. program, a conditional letter of acceptance will be sent providing confirmation of a place, subject to the successful completion of the baccalaureate degree with no less than 65% average in the final two years. The *final official transcript* (in duplicate) confirming degree awarded must be received by the School *no later than JUNE 30th*.
3. A brief biographical summary, including chronology and description of educational, travel and work experience.
4. A portfolio containing evidence of creative work consisting of original sketches, drawings, paintings, sculpture, crafts, photography, or other similar work. Additional information and instructions pertaining to the presentation of this portfolio is given in the "Information for Prospective Students" bulletin issued by the School. Deadline April 30.
5. Statement of Interest outlining the reasons why the applicant wishes to study architecture and why he or she has chosen the School of Architecture at the University of British Columbia.
6. Testimonials. A minimum of two letters of reference from persons familiar with the applicant's experience, interests, and abilities relevant to the study of architecture.

Applications not meeting the above-noted minimum requirements and deadlines will not be considered by the Admissions Committee.

Interest in the program exceeds the School's resources and facilities, so that places are awarded on a comparative merit basis. The School reserves the right to reject applicants for admission even though they may nominally meet entrance requirements.

All applicants to the School should note the Workshop Course which is mandatory for entering students. This course is an integral part of the design program in First Year. It is normally of two weeks duration and commences about mid-August each year. Dates and other particulars concerning the Workshop Course are normally issued together with the Notice of Admission mailed to successful applicants. Students accepted into the first year class who are unable to attend the full Workshop Course, or who fail to remit the course fee by the prescribed time, will have their admission cancelled.

Students notified of admission to the School who subsequently find that they are unable to attend, are advised that they must re-apply as new applicants for the following or a later session, including any appropriate revisions or extension to their application materials. A student whose application is rejected may seek the advice of the Admissions Committee prior to submitting a new application to the School. An early request for such advice is encouraged in order to facilitate possible enrolment in further academic studies, or to acquire relevent experience.

Re-admission

Students previously registered in the School of Architecture who were not registered in the immediately preceding winter session must make application for readmission through the Registrar's Office not later than June 15 or by December 1 for the second term.

BACHELOR'S DEGREE PROGRAM (B.Arch.)

Instruction in the School is offered through several types of courses:

a) The INTRODUCTORY WORKSHOP, given to all new students entering the program, for a period of about two weeks prior to Registration; involves the study of selected environments in the course of an extended field trip.
b) LECTURE COURSES AND SEMINARS
c) DESIGN TUTORIAL COURSES based on individual instruction using the project method. The student develops designs and communicates ideas through drawing for projects which may by hypothetical, or proposals for actual projects and sites. Students are expected to present and defend their proposals in the course of critical dialogue with faculty, visiting professionals, and their peers during reviews.

Program of Study: Effective September 1986, to qualify for the degree of Bachelor of Architecture, an incoming student must complete satisfactorily a minimum of 55 units of course work selected on the basis of the following course of study:

3 Required Workshop Courses

406 Introductory Workshop	1 unit
411 Computer Workshop	0 unit
412 Techniques Workshop	1 unit
	Total — 2 units

13 Required Lecture Courses (each 1½ units unless noted otherwise)

413 Introduction to Issues and Ideas in Architecture
*404 Architectural History
*405 Architectural History

one of

445 Current Theories of Architecture
or 424 History of Urban Form
or 448 History of Theories of Architecture

*409 Introduction to the Behavioural Basis of Design
*426 Architectural Technology 1
*416 Architectural Structures 1
*452 Environmental Control Systems 1
427 Architectural Technology 2
436 Architectural Structures 2
454 Environmental Control Systems 2
*423 Process and Practice of Architecture 1
422 Project Costing (½ unit)

Note: Course marked with an * are prerequisite to more advanced level courses and should therefore be completed in the first and second year of the program. Courses 412, 413, and 426 are taken concurrently with 400 design tutorial.

Total 18½ units

7 Design Courses	Total 28½ units
4 Elective Courses	Total 6 units
Program Total	55 units

Standing and Promotion

A student must:

(i) Attain a mark of NOT LESS THAN 65% in ARCH 400, ARCH 440 and ARCH 499, and NOT LESS THAN 50% in all other Tutorials and Courses.
(ii) Attain an AVERAGE mark of NOT LESS than 65% over each term's work.
(iii) On completion of ARCH 421, submit a portfolio including work from ARCH 400, 401, 420, and 421 (460 if applicable) for review by the faculty.

Should a student not attain a 65% mark in ARCH 400, the following conditions would apply:

(i) If the mark is less than 50% then the student is required to withdraw from the program for 8 months and retake ARCH 400 in a subsequent Fall Term.
(ii) If the mark is between 50% and 65% then the student will not be given credit for the ARCH 400. The student will be required to re-register for ARCH 400 in the following term.

Faculty approval based on the portfolio submitted on completion of ARCH 421, is required before a student may register in ARCH 440. If this approval is not given, then the student will be required to re-register in ARCH 421.

The criteria to be used in determining faculty approval will be: overall academic standing in design; design ability in a broad range of design topics, and a demonstration of a 'state of readiness' to proceed with the Graduation Project. Those students who have not maintained an average grade for ARCH 400, 401, 420, and 421 of 65% may be required to repeat ARCH 421. Other students may be advised to repeat ARCH 421.

Should a student not attain a 65% mark in ARCH 440 then the student must repeat the Tutorial.

Failure to attain the necessary requirements after two consecutive attempts will require that the student withdraw from the program for 12 months.

Failure to attain the necessary requirements in a total of three Tutorials will require a student to withdraw from the School, and the student not be allowed to re-register in the program.

Should a student not attain an average of 65% for a term's work the student will lose credit for those courses in which a grade of less than 65% was achieved. Under

special circumstances a student will be granted the opportunity to undertake supplementary work in courses to raise their average to 65%.

Failure to attain an average mark of 65% in two consecutive terms will require a student to withdraw from the program for 12 months.

Failure to attain an average term mark of 65% in a total of three terms will require the student to withdraw from the School, and the student will not be allowed to re-register in the program.

Faculty approval is required before a student may register for ARCH 440. If this approval is not given, then the student will be required to re-register for ARCH 421. The criteria to be used in determining approval to proceed will be the average marks for 401, 420, and 421, which should be 65% or higher.

Students who do not obtain the 65% average in these courses will be required to submit a portfolio including work from 400, 401, 420, and 421 for review by the faculty.

GRADUATION PROJECT

Special requirements and conditions apply to the Graduation Project, which includes both ARCH 498 and ARCH 499.

Graduation Project, Part 1 (Arch. 498)

Each student enrolled in ARCH 498 will select a member of faculty from an approved list to act as a mentor. This mentor must approve the topic and agree on the approach the student proposes to take to the graduation project, and record this approval and information on an approved form before the student may register in the course. In order to register for this course, a 200-300 word PROPOSAL must be submitted to and approved by the mentor who then will initial the student's Personal Record Sheet.

A student undertaking a design-oriented project should include in the Project Report, in addition to the background investigations, the relevant physical or facilities programming material. The intention is to facilitate early on-the-board design studies at the beginning of the following term.

The ARCH 498 report must:

(i) Be completed in one term and a grade assigned prior to the marks meeting of that term.

(ii) Should the work be incomplete then either:
  (a) A FAIL grade be automatically assigned. The student may re-register for ARCH 498 the following term, or,
  (b) In special circumstances and at the discretion of the Mentor, the student may be granted an extension on the completion date.

Failure to meet the necessary requirements after two attempts will require that the student withdraw from the program for 12 months.

Graduation Project, Part 2 (Arch. 499)

No student will be permitted to proceed with ARCH 499 until the student has passed ARCH 498 and reduced any outstanding unit requirements to a maximum of 9 units.

Each student enrolled in ARCH 499 shall have a Committee, the Chairman of which will normally be the mentor from Part 1, or a member of the faculty chosen from an approved list by the student. The Chairman, in consultation with the student, will appoint 2 additional members to the Committee who may be from the School faculty or the community at large. The student will proceed under the direction of the Chairman who will call a minimum of three meetings of the Committee at appropriate stages of the project to review progress. At the first meeting of the Committee, the terms of reference for the project and the expectations of the Committee will be defined. At the final meeting prior to the published date in the term in which the project was begun, the Committee will determine whether the project is substantially complete and to be prepared for presentation. The Chairman, in consultation with the Committee, will assign a grade at this time.

The following conditions apply:

(i) Students who have achieved at least 65% will be required to make a public presentation of their work at a date scheduled by the School, and to submit a final report in duplicate by a specified deadline in order to complete the requirements for the degree.

(ii) If, at the final meeting, the Committee decides that the graduation project is not substantially complete the student may, at the discretion of and only with the permission of the Committee, re-register for the next consecutive term. The student must complete the project by the end of that term and achieve a mark of not less than 65%. If the student fails to do so a fail grade will be assigned.

(iii) If the Committee decides not to allow a term extension, then a fail grade will be assigned.

If a fail grade is assigned the student will be required to withdraw from the School for a minimum period of 12 months. The student may then register for ARCH 499 and begin again with a new topic, mentor and committee. It will be necessary for the student to undertake preparation work, without credit, prior to re-registering.

Failure to attain the necessary requirments after repeating a Graduation Project will require the student to withdraw from the School and the student will not be allowed to re-register in the program.

Should a student not complete the program in six calendar years from the date of first registering in the School, the student must appeal for permission to re-enrol. Such an appeal will be granted only after the appeal has been reviewed by the Director of the School of Architecture and approved by the Senate Admissions Committee.

Honours Standing

At graduation, successful candidates will be graded as follows: First Class, an average of 80% or over; Second Class, 65% to 79%. Honours standing will be granted to a student who has obtained an over-all average of 80% or over in the Final Year and 75% or over during the two previous years with no subject below 50%.

Portfolio

All students are required to keep a portfolio of their work in each Tutorial for review by faculty at the end of each term in which the Tutorial is held.

The portfolio must contain, at a minimum, all the presentation drawings from each project in a Tutorial, but these may be reproductions of originals.

The portfolio is to be kept available for review in case of an appeal of grade in the Tutorials or other dispute regarding the student's standing.

Advanced Standing

Depending on previous experience and success in both studio and course work, in certain circumstances students may be given advanced standing in the program. Normally advanced standing is only granted for courses other than Tutorials. This will be on a course for course basis and normally only granted when valid University level credit has been obtained at another institution in the subject area concerned and the School is satisfied that the work is equivalent.

Advanced standing will not be considered until the student has successfully completed one year in the program, and only then on the recommendation of the student's adviser and current Tutorial Chairperson.

External Courses

Students may undertake courses outside the School of Architecture for credit toward their degree. Such courses must be demonstrated to be relevant to the student's program of study. Students must submit the request for permission to enrol in the course, in writing, to the Standing and Promotions Committee. Credit will be granted on presenting a valid transcript from the institution concerned.

Except for special circumstances, the limit on external courses is 3 units.

Supplementary Work

No Supplementary work is available in Tutorials.

For courses other than Tutorials, the normal university regulations apply. Only in exceptional circumstances will a student be allowed to undertake supplementary work in those other Architecture courses which are assessed on a continuing basis throughout the term.

Evaluations and Appeals

In the event that a student disagrees with the evaluation for a particular course, the student should first consult the faculty member in question and then, if necessary, seek the advice of the Chairman of the Standings and Promotion Committee. If a re-read of a Course examination is requested, the student should follow the normal university procedure.

In the event that a student disagrees with the evaluation in a design tutorial, a student should:

(i) Consult the design tutors involved, and then, if still not satisfied, should formally request in writing to the Director that an Appeal Committee be established to hear the case. This request will only be granted if it occurs within one week of the student formally receiving the grade, and will not be granted if, in the interim, the student has enrolled in and completed an additional tutorial. The tutorial Appeals Committee will consist of 3 of the full-time design tutors plus the Director, ex-officio, and it will have the authority to interview all persons involved and to recommend to the Director that the grade be affirmed or changed. The decision of the Director shall be final with respect to the academic aspect of the appeal.

(ii) If the student is not satisfied with respect to procedure or feels unjustly dealt with, the student can appeal further through the Registrar to the Senate Committee on Appeals on Academic Standing.

Practical Experience

In the summer months students are encouraged to gain practical experience in areas closely related to their interests in the School. Travelling is encouraged, or work in an architect's, engineer's, landscape architect's or planner's office. Alternatively, research is suggested at a university or with a public or private organization. Experience in the field of construction is also recommended. The School will advise the student whenever possible.

Professional Registration

The practice of architecture in Canada is governed by legislation enacted by the Provinces. The Architectural Profession Act in British Columbia, prescribes the qualifications for membership including academic and experience requirements. Legal protection of the title "Architect" is contained in the Architectural Profession Act.

In recent years the architectural profession has undergone significant changes in both structure and operation particularly with respect to the objectives, standards, and procedures affecting admission to the profession. The first of these recent developments relates to academic qualifications. By consent of all Provincial Associations (except Quebec) the Royal Architectural Institute of Canada has established the R.A.I.C. Certification Board which administers a national program of academic certification and which has been adopted as a pre-requisite to registration in each of the Provinces. The national program involves individual assessment of academic records submitted by all applicants, effective July 1, 1980. Under this new program the former practice of "recognizing" or "accrediting" Schools of Architecture in Canada will be discontinued by the provincial associations.

In British Columbia two additional programs are currently in operation and are essential elements in the registration process. The Architectural Act in B.C. requires a minimum of two years of experience in the employ of an architect subsequent to university graduation. During this 'intership' period, candidates are requested to enrol in the Architect-In-Training Program administered by the Examining Board of the A.I.B.C.

Finally, applicants for registration in British Columbia are required to attend a set of courses in Professional Practice which are presented twice annually. Completion of these courses and passing the prescribed written and oral examinations arranged by the Examining Board comprises the final stage of the registration process.

Students are encouraged to make contact with the profession by applying for admission as "Student Associate Members" in both the Provincial Association and in the Royal Architectural Institute of Canada. Informal contact with the profession through receipt of Institute publications and participation in local professional affairs, meetings, etc. offers valuable experience for students. Interested students should contact the offices of the Architectural Institute of British Columbia at 970 Richards Street, Vancouver, B.C. V6B 3C1 to obtain full particulars concerning student memberships in the A.I.B.C. as well as the academic and other requirements governing admission to the profession in British Columbia.

Anticipated Expenses Involved

Apart from the cost of living and tuition, certain additional expenses must be anticipated to cover books, equipment and workshop.

Students electing to undertake the course 'Study of Architecture Abroad' must be prepared to meet additional expense.

THE DEGREE OF MASTER OF ADVANCED STUDIES IN ARCHITECTURE (M.A.S.A.)

(See Faculty of Graduate Studies)

1986-87

THE FACULTY OF ARTS

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J. H. V. GILBERT, Professor of Audiology and Speech Sciences.
FRANK R. HAMLIN, Professor of French.
KARL I. KOBBERVIG, Associate Professor of Hispanic and Italian Studies.
MATSUO SOGA, Professor of Asian Studies.

Department of Music

Professor and Head
WILLIAM E. BENJAMIN, B.Mus. (McGill), M.F.A., Ph.D. (Princeton).

Professors
WALLACE BERRY, B.Mus., Ph.D. (Southern California).
H. ROBERT COHEN, B.A., M.A., Ph.D. (New York).
DIMITRI E. CONOMOS, B.Mus., M.Mus. (Sydney), D.Phil. (Oxon).
PAUL M. DOUGLAS, B.M.E. (Central Methodist), M.Mus. (Hartford).
JAMES L. FANKHAUSER, B.Mus. (Oberlin), M.A. (Calif., Berkeley).
CORTLAND R. HULTBERG, B.Sc. (Northern Illinois), M.Mus. (Arizona), M.S. (Illinois).
JOHN A. LOBAN, B.A. (San Jose State), M.A. (Catholic Univ. of America).
HANS-KARL PILTZ, B.A. (Henderson State), M.Mus. (Northwestern).
ROBERT ROGERS, B.A. (Brit. Col.), M.A. (Washington).
ROBERT SILVERMAN, B.A. (Sir George Williams), B.Mus. (McGill), M.Mus., Artist Diploma, D.M.A. (Eastman School of Music).
FRENCH A. TICKNER, B.Mus., M.Mus. (Southern California).

Associate Professors
MARTIN C. BERINBAUM, B.S. in Trumpet and Music Ed. (Southern California), M.S. in Trumpet (Juilliard School of Music).
ALEXANDRA J. BROWNING-MOORE, A.T.C.M. (Toronto Conservatory of Music), B.Mus. (Brit. Col.)
GREGORY G. BUTLER, B.Mus. (McGill), M.A., Ph.D. (Toronto).
STEPHEN G. CHATMAN, B.Mus., (Oberlin), M.M. (Michigan)
JANE A. COOP, B.Mus. (Toronto), M.Mus. (Peabody).
J. EVAN KREIDER, B.A. (Goshen College), M.M., Ph.D. (Indiana).
JOHN E. SAWYER, B.A., B.Mus. (Brit. Col.), M.Mus. (Illinois), Ph.D. (Toronto).
JAMES R. SCHELL, B.A., B.M. (North Texas State), M.Mus. (Yale).
DOUGLAS E. TALNEY, B.Mus. (Lewis and Clark), M.Mus. (Southern California).
EUGENE N. WILSON, B.Mus. (Southern California), M.A., Ph.D. (Washington).

Assistant Professors
DONALD G. BROWN, L.R.C.T, A.R.C.T.
JOHN B. ROEDER, B.A. (Harvard), Ph.D. (Yale).
ALAN THRASHER, A.A. (Valley Forge Jr. College), B.S. (Mansfield State College), M.M. (Ithaca College), Ph.D. (Wesleyan).
ERIC J. WILSON, B.Mus., M.Mus. (Juilliard).

Part-time Lecturers
ANTHONY AVERAY, A.R.C.M. (London).—Bassoon
DAVID A. BRANTER, M.M. (Indiana).—Saxophone.
EILEEN BROADIE-FEAY, B.Mus.Ed., M.Mus. (Wichita State).—Voice.
JAMES CHATER, B.A., D.Phil. (Oxon).—Music History.
GORDON CHERRY, B.Mus. (Eastman School of Music), Trombone, Vancouver Symphony Orchestra.—Trombone.
CAMILLE CHURCHFIELD, B.A. (Redlands).—Flute.
ROGER COLE, B.Mus. (Juilliard).—Oboe.
JERRY DOMER, B.Mus., (Missoula, Montana), M.Mus. (Boston University).—Oboe.
MARGOT EHLING, A.R.C.T., Artist Diploma (Toronto).—Piano.
RICHARD EPP, B.Mus. (Manitoba), M.Mus. (Southern California).—Opera, voice accompanist.
PHILIPPE ETTER, L.T.C.L. (Trinity College, London).—Viola.
JAMES I. EWEN, B.Mus. (Brit. Col.), M.Mus. (Cincinnati).—Bassoon.
WESLEY FOSTER.—Clarinet.
KENNETH J. FRIEDMAN, B.Mus. (Southern California), M.S. (Juilliard).—Double Bass.
JEROLD C. GERBRECHT, B.M.E. (Louisville), M.M. (Kentucky).—Trumpet and Cornet.
BRIAN F. G'FROERER, B.Mus. (Brit. Col.).—French Horn.
PETER HANNAN, B.Mus. (Brit. Col.).—Recorder.
MARJORIE E. HOUGHAM, A.T.C.M. (Toronto Conservatory of Music).—Piano.
MILAN HURT, Diploma (Prague Conservatory).—Double Bass.
ROBERT C. JORDAN.—Guitar.
CAROL JUTTE, A.R.C.T., L.R.S.M., A.R.C.M.—Piano.
R. SHARMAN KING, B.Mus. (Brit. Col.).—Trombone and Low Brass.
KAREN KOCH, B.Mus. (Brit. Col.), M.A. (Washington, Pullman).—Oboe.
KUM SING LEE, Diploma (Hochschule für Musik Berlin), M.Mus. (Rosary College, Villa Schifanoia, Florence); L.R.S.M., L. Mus. A.—Piano.

KEITH MacLEOD.—Clarinet.
JANE KAY MARTIN, B.Mus. (Cleveland Inst. of Music), M.M. (Oregon).—Flute.
CHRISTOPHER J. MILLARD.—Bassoon.
DENNIS MILLER, L.R.A.M. partial (Royal Academy of Music, London).—Tuba.
KENNETH W. MOORE.—Percussion.
TONY NICKELS, B.Mus. (Calif. L.A.).—Oboe.
RAY NURSE.—Lute.
DOREEN A. OKE, B.Mus. (Brit. Col.).—Harpsichord.
THOMAS PARRIOTT, B.Mus.Ed. (Houston), M.Mus. (Texas, Austin).—Trumpet.
ERIK RALKSE, B.Mus., M.Mus. (Juilliard).—French Horn.
GENE RAMSBOTTOM.—Clarinet.
ALAN RINEHART, Associate in Arts (Southwestern Michigan College).—Guitar.
DAVID ROBBINS, B.S. (Sam Houston), M.S. (Southern California).—Trombone and Jazz.
JOHN RUDOLPH, M.Mus. (Catholic U. of America).—Percussion.
DOUGLAS SPARKES, B.Mus. (Toronto).—Trombone.
GERALD STANICK.—Violin, Viola.
MICHAEL STRUTT.—Guitar.
MARY J. TICKNER, B.Mu.Ed. (Evansville), M.Mus. (Southern California).—Piano.
TIMOTHY VERNON.—Orchestra.
ELIZABETH VOLPÉ, B.Mus. (Toronto).—Harp.
MICHAEL WALL, B.Mus. (Houston).—French Horn.
PATRICK WEDD, B.Mus. (Toronto), M.Mus. (Brit. Col.).—Organ.
ZHENGHUA ZHENG.—Chinese Instruments.

Lecturers from the Faculty of Education
ALLEN CLINGMAN, B.M.E., M.M.E. (Drake), M.A., Ed.D. (Columbia), Professor of Music Education.
THEO GOLDBERG, M.A. (Western Washington), D.M. (Toronto), Professor of Music Education.
G. CAMPBELL TROWSDALE, B.Mus., Ph.D. (Washington), M.Ed., Ed.D. (Toronto), A.R.C.T., Professor of Music Education.

Department of Philosophy

Professor and Acting Head
PETER REMNANT, M.A. (Brit. Col.), Ph.D. (Cantab.).

Professors
SAMUEL C. COVAL, M.A. (Man.), Ph.D. (N. Carolina), D. Phil. (Oxon).
JAMES DYBIKOWSKI, A.B. (Amherst), Ph.D. (London).
THOMAS E. PATTON, B.A. (Oberlin), M.A., Ph.D. (Harvard).
ROBERT J. ROWAN, M.A., Ph.D. (Calif.).
RICHARD I. SIKORA, A.B. (Harvard), Ph.D. (Calif.).

Associate Professors
HOWARD JACKSON, B.S. (Illinois), Ph.D. (Calif.).
EDWIN LEVY, B.S. (N. Carolina), A.M., Ph.D. (Indiana).
RICHARD E. ROBINSON, B.A. (Puget Sound), M.A. (Syracuse), Ph.D. (Calif.).
STEVEN F. SAVITT, A.B. (Columbia College), Ph.D. (Brandeis).

Assistant Professors
JOHN P. STEWART, B.S., M.S. (Penn.).
GARY A. WEDEKING, B.A. (San Diego State College), M.A., Ph.D. (Washington University).
EARL R. WINKLER, B.A. (Los Angeles State), M.A., Ph.D. (Colorado).

Senior Instructor
ELBRIDGE N. RAND, A.B. (Harvard).

Adjunct Professor
PHILIP P. HANSON, B.A. (Calgary), M.A., Ph.D. (Princeton).

Lecturers from other Departments
DANIEL L. OVERMEYER, Professor of Asian Studies.
SHIRLEY D. SULLIVAN, Associate Professor of Classics.
ROBERT B. TODD, Associate Professor of Classics.

Department of Political Science

Professor and Head
DAVID J. ELKINS, B.A. (Yale), M.A., Ph.D. (Calif.).

Professors
DONALD E. BLAKE, B.A., M.A. (Alberta), Ph.D. (Yale).
H. ALAN C. CAIRNS, M.A. (Toronto), D.Phil. (Oxon), F.R.S.C.
G. A. FEAVER, B.A. (Brit. Col.), Ph.D. (London).
K. J. HOLSTI, A.M., Ph.D. (Stanford), F.R.S.C.
ROBERT H. JACKSON, B.A., M.A. (Brit. Col.), Ph.D. (Calif.).
JEAN A. LAPONCE, Dipl.I.E.P. (Paris), Ph.D. (Calif.), F.R.S.C.
W. J. STANKIEWICZ, M.A. (St. Andrews), Ph.D. (London).
MICHAEL D. WALLACE, B.A., M.A. (McGill), Ph.D. (Michigan).
MARK W. ZACHER, B.A. (Yale), M.A., Ph.D. (Columbia).

Associate Professors
KEITH G. BANTING, B.A. (Queen's), D.Phil. (Oxon).
PETER A. BUSCH, B.A. (Harvard), M.A. (Wisconsin), Ph.D. (Yale).
R. KENNETH CARTY, B.Sc.F. (New Brunswick), M.A. (Oxon), Ph.D. (Queen's).
RICHARD G. C. JOHNSTON, B.A. (Brit. Col.), M.A., Ph.D. (Stanford).
PAUL J. MARANTZ, B.A. (Cornell), M.A., Ph.D. (Harvard).
PHILIP RESNICK, M.A. (McGill), Ph.D. (Toronto).
PAUL R. TENNANT, B.A. (Brit. Col.), M.A., Ph.D. (Chicago).
JOHN R. WOOD, B.A. (Toronto), M.A., Ph.D. (Columbia).

Assistant Professor
HEATH B. CHAMBERLAIN, B.A. (Princeton), M.A., Ph.D. (Stanford).

Department of Psychology

Professor and Head
RICHARD C. TEES, B.A. (McGill), Ph.D. (Chicago).

Professors
MICHAEL J. CHANDLER, B.A. (Grinnell), Ph.D. (Calif.).
STANLEY COREN, A.B. (Pennsylvania), Ph.D. (Stanford).
KENNETH D. CRAIG, B.A. (Sir George Williams), M.A. (Brit. Col.), Ph.D. (Purdue).
A. RALPH HAKSTIAN, B.A. (Brit. Col.), M.A., Ph.D. (Colorado).
ROBERT D. HARE, M.A. (Alta.), Ph.D. (Western Ontario).
DANIEL KAHNEMAN, B.A. (Jerusalem), Ph.D. (Berkeley).
DOUGLAS T. KENNY, M.A. (Brit. Col.), Ph.D. (Wash.).
ROMUALD LAKOWSKI, M.A. (Glasgow), Ph.D. (Edinburgh).
ANTHONY G. PHILLIPS, M.A., Ph.D. (Western Ontario).
JOHN P. J. PINEL, M.A. (Calgary), Ph.D. (McGill).
STANLEY JACK RACHMAN, M.A. (Witwaterstand), Ph.D. (London).
PETER SUEDFELD, B.A. (Queens College), M.A., Ph.D. (Princeton).
ANNE TREISMAN, B.A. (Cantab), D.Phil (Oxon).
JERRY WIGGINS, A.B. (American Univ., Washington, D.C.), Ph.D. (Indiana).
RODERICK WONG, B.A. (Brit. Col.), M.A. (West Michigan), Ph.D. (Northwestern).

Associate Professors
DAVID J. ALBERT, B.A. (Kansas), M.A., Ph.D. (McGill).
D. SUSAN BUTT, M.A. (Brit. Col.), Ph.D. (Chicago).
RAYMOND S. CORTEEN, M.A., Ph.D. (Edinburgh).
DONALD G. DUTTON, M.A., Ph.D. (Toronto).
BORIS GORZALKA, B.Sc. (McGill), Ph.D. (Calif.).
ROBERT E. KNOX, M.A. (Occidental), Ph.D. (Ore.).
ROBERT J. McMAHON, B.A. (Virginia), Ph.D. (Georgia).
DEMETRIOS PAPAGEORGIS, A.B. (Hamilton), M.A., Ph.D. (Illinois).
JAMES A. RUSSELL, M.A., Ph.D. (UCLA).
JAMES H. STEIGER, B.A. (Cornell), M.S. (Oklahoma), Ph.D. (Purdue).
LAWRENCE J. WALKER, B.A. (New Brunswick), Ph.D. (Toronto).
LAWRENCE M. WARD, A.B. (Harvard), Ph.D. (Duke).
DONALD M. WILKIE, M.A., Ph.D. (Manitoba).
TANNIS MacBETH WILLIAMS, B.A. (Brit. Col.), M.S., Ph.D. (Purdue).
JOHN YUILLE, M.A., Ph.D. (Western Ontario).

Assistant Professors
LYNN ALDEN, M.A., Ph.D. (Illinois, Champaign).
JENNIFER D. CAMPBELL, M.S., Ph.D. (Georgia).
KEITH S. DOBSON, M.A., Ph.D. (Western Ontario).
GUY J. JOHNSON, M.A., Ph.D. (Texas).
WOLFGANG LINDEN, Diploma Psychology (Muenster), Ph.D. (McGill).
DELROY L. PAULHUS, M.S., Ph.D. (Columbia).
REVA POTASHIN, M.A., Ph.D. (Toronto).
PHILIP M. SMITH, B.A. (McGill), Ph.D. (Bristol).
FRED P. VALLE, A.B. (Calif.), Ph.D. (Michigan).

NSERC University Research Fellows
ERIC EICH, B.A. (Maryland) Ph.D. (Toronto).

Department of Religious Studies

Professors
HANNA E. KASSIS, B.A. (American University of Beirut), Ph.D. (Harvard).
C. G. WILLIAM NICHOLLS, M.A. (Cantab.).

Associate Professors
CHARLES P. ANDERSON, A.B. (Willamette), M.Div. (Union Theological Seminary), Ph.D. (Columbia).

N. KEITH CLIFFORD, B.A. (Manitoba), B.D. (United), Ph.D. (London).
SHOTARO IIDA, M.A. (Tohoku), Ph.D. (Wisconsin).

Assistant Professor
PAUL G. MOSCA, B.A. (Fordham), A.M. (Harvard), Ph.D. (Harvard).

Lecturer
DANIEL I. SIEGEL, B.A. (Rutgers), M.A. (Temple)

Lecturers from other Departments
ASHOK AKLUJKAR, Professor of Asian Studies.
LEON HURVITZ, Professor of Asian Studies.
MARY MOREHART, Associate Professor of Fine Arts.
DANIEL L. OVERMYER, Professor of Asian Studies.
I. MARC PESSIN, Instructor of Fine Arts.

Department of Slavonic Studies

Professor and Head
BOGDAN CZAYKOWSKI, B.A. (Dublin), M.A. (London).

Professor
MICHAEL H. FUTRELL, B.A., Ph.D. (London).

Associate Professors
BARBARA HELDT, B.A. (Wellesley College), M.A. (Columbia), Ph.D. (Chicago).
PETER PETRO, M.A. (Brit. Col.), Ph.D. (Alta.).
NICHOLAS POPPE, B.A. (London), Ph.D. (Indiana).
CHRISTOPHER J. G. TURNER, M.A., M.Phil. (Oxon), M.A., Ph.D. (Cantab.).

Assistant Professors
IRINA M. REID, M.A. (Brit. Col.), L.R.S.M., A.R.T.C.

Senior Instructors
ARAM H. OHANJANIAN, B.A. (Toronto), M.A., (Brit. Col.).
IRINA REBRIN, B.A. (Fu Jen).

Department of Theatre

Associate Professor and Head
JOHN BROCKINGTON, B.A. (Brit. Col.), D.F.A. (Yale).

Professors
ERROL DURBACH, M.A. (Rhodes), M.A. (Cantab), Ph.D. (London).
A. J. REYNERTSON, M.A. (Calif.), Ph.D. (Stanford).

Associate Professors
BRIAN JACKSON (Old Vic Theatre School, London).
PETER LOEFFLER, D.Phil. (Basel, Switzerland).
KLAUS G. STRASSMANN, Ph.D. (Stanford).
ARNE ZASLOVE, B.F.A. (Carnegie-Mellon), Diploma (Ecole Jacques Lecoq).

Assistant Professors
DON DAVIS, B.S. (Southwestern Missouri), M.S., Ph.D. (Southern Illinois).
RAYMOND J. HALL
JOHN S. NEWTON, M.A. (Berkeley, San Francisco State).
CHARLES SIEGEL, B.A. (Brandeis), M.F.A. (Yale).
STANLEY A. WEESE, B.A. (Minn.), M.A. (Illinois).
M. NORMAN YOUNG, B.A. (Brit. Col.).

Senior Instructors
IAN C. PRATT, Technical Director.

Lecturers
ROD MENZIES
AL SENS (Part-time).
JOANNE YAMAGUCHI, (Part-time), M.A., Ph.D. (Colorado).

See sections following 'Faculty of Arts' for:-
School of Family and Nutritional Sciences
School of Library, Archival and Information Studies
School of Social Work

THE FACULTY OF ARTS

The Faculty of Arts, through its Schools and Departments, offers the following degrees and diplomas:

Bachelor of Arts (B.A.)
Bachelor of Fine Arts (B.F.A.) — in Creative Writing, Fine Arts, and Theatre
Bachelor of Home Economics (B.H.E.)
Bachelor of Music (B.Mus.)
Bachelor of Social Work (B.S.W.)
Master of Archival Studies (M.A.S.)
Master of Library Science (M.L.S.)
Diplomas in: Applied Linguistics, Art History, Film/Television Studies, French Translation

Information about the programs leading to these degrees and diplomas is given below, in this section and in the sections for the Schools of Family and Nutritional Sciences, Library, Archival and Information Studies, and Social Work.

Admission

For admission requirements see section on Admission in the General Information section of the Calendar.

Faculty Advisers

The Faculty Advisers, who are members of the teaching staff of the Faculty, administer Faculty (but not Department) regulations governing programs of study leading to the B.A., B.F.A. and B.Mus. degrees. They assist first and second year students to plan their programs; their approval is required for course changes and withdrawals for all undergraduates.

Inquiries about appointments with the Senior Faculty Adviser (Room A207 in the Buchanan Building) should be directed either by telephone (228-4028) or by mail to the Senior Faculty Adviser, c/o The Dean of Arts, The University of British Columbia, 2075 Wesbrook Mall, Vancouver, B.C. V6T 1W5.

Programs of Study

These regulations apply to students in the B.A. and B.F.A. programs. Students in B.F.A. programs should also note the special requirements set out below, under Creative Writing, Fine Arts, and Theatre. Students in any other degree-program in the Faculty should consult the description, below, of their particular degree-program.

Every student is responsible for drawing up a program of study that meets the requirements of the Faculty. There are two groups of requirements, **Faculty Requirements** and **Program Requirements,** which are described fully below. A Faculty Adviser must be consulted in the preparation of the program of study, but the responsibility for meeting the requirements is the student's.

A student completes 15 units of course work in each of the first two years of study. In the third and fourth years the student is enrolled in one of two programs of study: either the **Major Program,** which consists of a further 30 units of work (making a total for the degree of 60 units), or the **Honours Program,** which consists of a further 36 units of work (making a total for the degree of 66 units). If the Major Program is chosen, 15 units of work are required in each of the last two years; if the student is admitted to the Honours Program, 18 units of work are required in each of the last two years.

Students should note that the Major and Honours programs in most fields require that certain prerequisite courses be taken in the first and/or second years. See the regulations for individual programs given below under **Programs in the Faculty of Arts.**

Once registered in a particular program of study, a student must report in person to the Office of the Senior Faculty Adviser (Room A207 in the Buchanan Building) to make any change in the program of study. Except in special circumstances, a one-term course may be added or dropped from a student's program only within the first two weeks after the beginning of the course, and a two-term course within the first three weeks.

With special permission from the Senior Faculty Adviser, a student may complete the required number of units in less than the normal four years of the degree program, by combining credit obtained in Spring or Summer Session with that obtained in Winter Session.

Students other than those enrolling in programs for which the **Calendar** requires more than fifteen units of work in a session must have the permission of the Senior Faculty Adviser to register for more than fifteen units; such permission is given to students with high academic standing.

Part-Time Study

Part-time students should discuss their proposed programs with both the Senior Faculty Adviser and a departmental adviser in order to be informed of any special Faculty or departmental requirements or policies concerning part-time studies. Course prerequisites apply to part-time as well as to full-time students.

Part-time students are urged to complete the requirements for the degree in as short a time as possible, in order to avoid complications as a result of changes in programs.

For part-time students, references in the Calendar to YEAR should be considered as YEAR STANDING. Year Standing is as follows: A student has First-Year standing while completing the first 15 units of university course work or its equivalent, and Second-Year standing after completing the first 15 units and until completion of 30 units. After completing 30 units, a student in a Major program has Third-Year standing while completing the next 15 units of work, and Fourth-Year standing while completing the final 15 units of work to an overall total of 60 units. A student who enters an Honours program after completing the first 30 units has Third-Year

standing while completing the next 18 units of work, and Fourth-Year standing while completing the final 18 units of work to an overall total of 66 units.

Guided Independent Study

No more than half the units taken for credit at The University of British Columbia towards the degree of Bachelor of Arts may be taken through Guided Independent Study or other Correspondence Courses. In the last 30 units, no more than 21 may be taken through Guided Independent Study.

Enrolment in a Major or Honours Program

Students may enrol in a Major or Honours Program when they:

(i) have completed 30 units from lists A and B, *or*
(ii) are registered in courses which complete 30 units from these lists, *and*
(iii) have completed the prerequisite(s).
(iv) have satisfied the English 100 requirement.

Attendance

Regular attendance is expected of students in all their classes (including lectures, laboratories, tutorials, seminars, etc.). Students who neglect their academic work and assignments may be excluded from the final examinations. Students who are unavoidably absent because of illness or disability should report to their instructors on their return to classes.

Inability to Complete Requirements

If a student, because of extenuating circumstances such as illness or family bereavement, is unable to complete assigned work before the end of the session or to write final examinations, the Senior Faculty Adviser should be notified in writing, as soon as possible, with an explanation of the circumstances. In cases involving illness or injury a medical certificate must be obtained from the Student Health Service.

Satisfactory Standing

Students who take fifteen or eighteen units of work and obtain not less than 50% in each course are declared to be in good standing. The Faculty places students in the following categories:

First Class means an average of 80% or higher;
Second Class means an average of 65 to 79%;
Pass means an average of 50 to 64%.

Students are granted unit credit for any course which is successfully completed.

A student may repeat a failed course only once. This restriction does not apply to English 100 (which a student registered in the Faculty of Arts may repeat twice) or Mathematics 100; nor does it apply to students in the graduating year. In the case of courses terminal at Christmas, the course may not be repeated in the same academic year.

Unsatisfactory Standing

Fail standing will be assigned for any session in which a student has taken a study program of:

(i) more than 6 units and passed in less than 60% of it; or
(ii) 6 or fewer units and passed in less than 50% of it.

A student at any level of study who is assigned fail standing will be required to discontinue studies at the University for at least a year. A student who fails at the first- or second-year level will not normally be permitted to re-enrol to repeat that level of work, but if that level is completed successfully elsewhere, consideration will then be given to the student's readmission to the university. A student who fails for a second time, either in repeating a year or in a later year, will be required to withdraw from the University; after a period of at least a year, an appeal to the Senate Admissions Committee for permission to re-enrol will be considered.

A student who, for academic reasons, was required to withdraw from another Faculty or another university may enter the Faculty of Arts only if, upon appeal to the Dean, written permission to register is obtained.

Supplemental Examinations

In courses in the Faculty of Arts a supplemental examination will be available if there is a final examination which contributes at least 40% to the total possible grade. A student who is permitted to write a supplemental is being given an opportunity to improve the grade received for the final examination.

In all but the Final Year a student who has been granted a Supplemental may write it once only. If the student fails, the course must be repeated or a permissible substitute taken. Normally in the Final Year a second Supplemental Examination may be written.

A Supplemental Examination may be granted if:

a) the student has written the final examination and earned a course grade of at least 40%

and

b) the student has passed the required number of units (with an average of at least 60%) proportionate to registration, as set out below:

If registered in	must pass
18 units	12 units
15 units	12 units
12 units	9 units
9 units	6 units
6 units	3 units
3 units	1½ units

Supplemental Examinations are given in August. Students who fail a final examination in December cannot take a supplemental examination before August because this privilege, if granted, is based on the student's complete academic record, which cannot be determined until after the final examinations in April.

Transfer of Credit

Students in the Faculty of Arts who wish to take courses in other institutions for transfer of credit toward a B.A. degree must obtain permission from the Senior Faculty Adviser. The University has no obligation to grant transfer credit unless prior permission has been obtained.

The University will accept students on transfer from other institutions, subject to the restrictions set out in the **General Information** section of this **Calendar** under **Admission to the University.** However, at least 50% of the work credited to a degree in the Faculty of Arts must consist of U.B.C. courses.

Students with advance credit for English 100 or Arts One must pass the English Composition Test (see **English Composition Requirement,** below).

Transcript of Record

A course once credited to a particular year on the transcript of academic record cannot later be transferred to another year, even if that course is in excess of the required course load for the year to which it was credited.

Withdrawal

A student who decides to withdraw from the University must present a statement of clearance, signed by the Senior Faculty Adviser, to the Office of the Registrar. The Registrar will then grant Honourable Dismissal and decide whether or not there may be a refund of fees. The term Honourable Dismissal has nothing to do with academic standing. It simply means that, at the time of withdrawal, the student was in no disciplinary difficulty.

The Senate of the University reserves the right to require any student to withdraw, at any time, if that is in the best interests of the student or of the University.

FACULTY REQUIREMENTS

To complete degree programs in the Faculty, the student must satisfy certain preliminary, or general, requirements, as described below:

ENGLISH COMPOSITION REQUIREMENT

To qualify for the degrees of B.A., B.F.A., B.H.E., B.Mus., or B.S.W., students must satisfy the Faculty of Arts English Composition requirement. To do this, students must obtain credit for English 100 or Arts One *and* must pass the English Composition Test (ECT).

Students who enter the University before completion of their first 30 units of course work are expected to pass the English Composition Test before registering in the Faculty of Arts for their final 30 units. **No student who has not passed the Test will be permitted to register in the Faculty of Arts for the final 15 units.**

Students (including students transferring from other institutions) who have obtained credit for English 100 or Arts One but have not passed the Composition Test will write it in late September. This Test will also be given during the December examination period, in late March or April, and in July. Each student must attach a fee sticker to the ETC booklet. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services. Students who anticipate difficulty passing the Test are advised to enrol in a remedial English course in the Centre for Continuing Education.

SCIENCE REQUIREMENT

To qualify for the degree of Bachelor of Arts or Bachelor of Fine Arts, a student must satisfactorily complete EITHER (a) three units of work in the Faculty of Science (which includes Mathematics) OR (b) Geography 101 or 330 OR (c) Family and Nutritional Sciences 351 and 1½ units in a Science OR (d) Forestry 300.

Although this requirement may be met in any one of the four years, students are urged to discuss the Science Requirement with a Faculty Adviser when registering in the first year. Honours students, especially those in English and History, should make a special effort to satisfy the science requirement within the first two years of study.

The Faculty of Science offers a wide range of courses, including courses specially designed for students outside the Faculty of Science. The courses listed below have no special prerequisites. Each provides an elementary understanding of some particular area of science and, wherever possible, emphasizes matters of social concern.

These courses are designed to help non-scientists understand scientific matters and make decisions where science is involved. Most of them are primarily for third- and fourth-year students. Consult the descriptions under COURSES OF INSTRUCTION.

Biology 310, 311, 313
Botany 310
Geology 310
Geophysics/Astronomy 310
Oceanography 310
Physics 140, 340
Zoology 400

LITERATURE REQUIREMENT

To qualify for the degree of Bachelor of Arts or Bachelor of Fine Arts, a student must satisfactorily complete three units of work in literature in addition to English 100. This requirement may be met by taking English at the 200-level (normally in the second year) or a course in literature (including literature in translation and Women's Studies 224) offered by another Department of the Faculty. The following courses are acceptable as alternatives to Second Year English:

All 300- and 400-level courses in Chinese and Japanese except Chinese 300, 301, 302 and Japanese 301, 302, 310; also Hindi 405, 410, Sanskrit 424, and Urdu 401, with the permission of the Department of Asian Studies; all 300- and 400-level courses in Greek except Greek 325 and 410; all 400-level courses in Latin except Latin 410; all 300- and 400-level literature courses in the German language; all 300- and 400-level literature courses in Italian except Italian 449; all 300- and 400-level literature courses in Spanish except Spanish 349, 444, 449; French 220 and all 400-level literature courses in French except 401, 420, 449; Polish 445 and 446; Russian 430, 431, 432, 433; *except that such literature courses may not be offered to fulfil this requirement by those students who are majoring in the language.*

The acceptable courses in literature in translation are: Asian Studies 302, 335, 345, 350, 375, 415, 435; Classical Studies 310, 315, 316; French 400, 403; Germanic Studies 201, 303, 411; Italian Studies 310, 431; Spanish 220, 311, 312; Slavonic Studies 206, 306, 307, 308.

LANGUAGE REQUIREMENT

To qualify for the degree of Bachelor of Arts or Bachelor of Fine Arts, a student must have attained Grade 12 standing or the equivalent in French or a foreign language. If a Grade 12 course in such a language was successfully completed in secondary school, the student is not required to take further work in another language. If admitted to the Faculty with only Grade 11 in French or a foreign language, the student must satisfactorily complete *either* three units of work in the same language beyond the Grade 11 level (consult appropriate language departments as to which courses satisfy this requirement) or six units of work in another language other than English. If admitted to the Faculty with less than Grade 11 standing in French or a foreign language, the student must satisfactorily complete six units of work in one other language. Students who have not satisfied this requirement prior to registration in the Faculty of Arts must in their initial and subsequent registrations in the Faculty register in a program that leads to the fulfilment of this requirement. (Students taking Honours in Mathematics are referred to the Faculty of Science, as there are special requirements.)

Students should bear in mind that proficiency in one or more languages other than English is a requirement in many graduate programs. They are strongly advised, therefore, to continue the study of languages at the University.

COURSE SELECTION: FIRST YEAR

In choosing first-year courses, a student must satisfy the Faculty of Arts requirements in English and, when necessary, Language other than English (see above). The student will normally satisfy the science requirement and then choose other courses from List A to bring the total number of units to 15.

Special arrangements apply to students who take Arts One. See **Arts One** below, under **Programs in the Faculty of Arts.**

List A

Note: Courses followed by asterisks have prerequisites — consult course descriptions in the Courses of Instruction Section of this Calendar.

English 100(3)—Required Course

Anthropology 100(3), 201(1½/3), 202(1½/3), 203(1½), 204(1½), 205(1½), 206(3).
Arts One (9).
Asian Languages 300(3).
Asian Studies 105(3), 115(3), 206(3).
Biology 101(3) or 102(3).
Chemistry 103(3)*, 110(3)*, 120(3)*.
Chinese 100(3), 101(3)*, 180(6).
Classical Studies 100(3), 204(1½), 210(3).
Computer Science 101(1½)*, 114(1½), 116(1½), 118(1½)*.
Creative Writing 202(3)*, 301(3)*.
Czech/Slovak 325(3)
Economics 100(3).
Fine Arts 100(3), 125(3), 181(3).
French 100(6), 105(3), 110(3), 115(3), 120(3).
Geography 101(3), 110(1½), 190(1½), 220(1½), 260(1½).
Geology 105(3).
Geophysics 120(1½)*.
German 100(3), 110(3), 120(3), 123(6).
Germanic Studies 302(3).
Greek 100(3), 125(3).
Hebrew 305(3).
Hindi 300(3), 310(3).
History 101(3), 115(3), 120(3), 122(3), 125(3), 135(3), 170(3), 171(3).
Italian 100(3), 101(3), 105(6), 200(3)*.
Italian Studies 230(3).
Japanese 100(3), 101(3), 102(3), 103(3), 180(6).
Latin 100(3), 120(3).
Linguistics 100(3).
Mathematics 100(1½), 101(1½)*, 111(3), 120(1½)*, 121(1½)*, 130(3), 140(1½), 141(1½)*.
Music 103(1½/3), 106(1½/3), 120(1½), 121(1½), 135(1), 150-156(¼), 159(¼), 160-165(¼).
Philosophy 100(3), 102(3), 115(3), 210(3).
Physics 110(3)*, 115(3)*, 120(3)*, 140(3).
Polish 110(3).
Portuguese 102(3).
Psychology 100(3).
Religious Studies 100(3), 202(3), 204(3).
Russian 100(3), 110(6), 325(3).
Sanskrit 305(3).
Slavonic Studies 105(3), 110(1½), 206(1½/3).
Sociology 100(3).
Spanish 100(3), 105(6), 110(3)*, 200(3)*, 205(3)*, 211(3).
Statistics 105(1½)*.
Theatre 120(3), 200(3).
Ukrainian 325(3).

COURSE SELECTION: SECOND YEAR

Language other than English (if required; language courses in List A may be taken in the second year).

English at the 200-level or other course satisfying literature requirement (see above).

A number of elective courses to bring the total number of units to 15.

These second-year electives are normally chosen from Lists A and B, unless they form part of the student's Major or Honours Program.

Note: there are prerequisites for many of the courses in List B. Consult course descriptions in the **Courses of Instruction** section of this **Calendar** before drawing up a program.

List B

Anthropology 200(3), 213(1½/3), 214(1½/3), 217(1½), 220(1½), 221(1½), 240(1½).
Asian Languages 400(3).
Asian Studies 225(3), 302(3), 335(3), 345(3), 350(3), 435(3).
Astronomy 200(3).
Biology 200(1½), 201(1½), 202(3).
Botany 209(1½), 210(1½), 211(3).
Chemistry 201(1½), 202(1½), 203(3), 205(3), 208(3), 230(3).
Chinese 200(3), 201(3), 280(6).
Classical Studies 305(3), 310(3), 315(3), 316(3), 330(3), 331(3).
Computer Science 210(1½), 213(1½), 220(1½).
Economics 201(1½), 202(1½), 206(1½), 207(1½), 254(3), 303(1½), 304(1½), 306(3), 307(3), 312(3), 319(3), 320(1½), 325(1½), 326(1½), 334(3), 336(3), 341(1½), 342(1½), 345(3), 350(3), 355(1½), 360(1½), 361(1½), 365(1½), 370(1½), 371(1½), 374(1½), 384(1½).
English 201(3), 202(3), 203(3), 204(1½), 205(1½), 206(1½), 207(1½), 208(3), 210(3), 211(3), 301(1½), 303(3), 329(3).
Fine Arts 225(1½), 226(1½), 251(1½), 261(1½), 281-290(1½).
French 202(3), 215(3), 220(3), 320(3), 400(3), 403(3).
Geography 202(1½), 205(1½), 306(1½), 370(1½), 371(1½), 372(1½), 373(1½), 374(1½).
Geology 200(1½), 206(1½), 226(1½), 309(1½).
German 200(3), 223(3), 233(3), 333(3).
Germanic Studies 201(3), 301(3), 303(3), 412(3).
Greek 200(3).
Hebrew 405(3).
Home Economics 303(1½).
Hindi 400(3).
History 201(3), 202(3), 203(3), 205(1½), 207(1½), 208(1½), 237(3), 270(3), 271(3), 273(3).
Italian 200(3), 201(3).
Italian Studies 310(3), 330(3).
Japanese 200(3), 201(3), 280(6).
Latin 200(3), 205(6).
Linguistics 200(3).
Mathematics 200(1½), 201(1½), 205(1½), 220(1½), 221(1½), 222(3), 225(3), 315(1½).
Medieval Studies 200(3).
Microbiology 200(3).
Music 220(1½), 221(1½), 235(1), 321(1½/3), 326(1½/3).
Philosophy 201(3), 214(3), 250(3), 302(1½), 303(1½), 306(1½).
Physics 213(2), 215(2), 216(2), 230(1), 340(3), 341(1½).
Polish 210(3).
Political Science 200(1½), 220(1½), 240(1½), 260(3), 280(1½).
Portuguese 202(3).
Psychology 200(3), 206(3).
Religious Studies 205(3), 308(3).
Russian 200(3), 215(1½), 425(3).
Sanskrit 414(3).
Slavonic Studies 306(3), 307(1½/3), 308(1½/3), 310(1½/3), 340(3).
Sociology 200(3), 201(1½/3), 210(3), 213(1½/3), 214 (1½/3), 220(3), 230(3), 240(1½/3), 250(1½/3).
Soil Science 300(1½).
Spanish 200(3), 205(3), 211(3), 220(3), 311(3).
Statistics 203(1½), 204(1½), 205(1½).
Theatre 220(3), 230(3), 233(1½), 250(3), 251(3), 261(3), 262(3), 350(3).
Ukrainian 425(3).
Urban Studies 200(3).
Women's Studies 222(3), 224(3).
Zoology 203(1½), 205(1½), 206(3).

PROGRAM REQUIREMENTS.

By the beginning of the Third Year a student must enter **EITHER** a Major Program (which requires a measure of specialization) **OR** an Honours Program (which requires intensive work in one subject or field of specialization). Specific programs are described below under **Programs in the Faculty of Arts.**

Major Program

On entering a Major program, the student must draw up a plan of study for the last 30 units of course-work in consultation with a departmental adviser. Before undertaking the final 15 units of the program, the student must have the plan of study reviewed by a departmental adviser.

In the last 30 units of course-work toward the B.A. degree, a student in a Major program must (a) complete at least 24 units of work in courses numbered 300 or above: (b) satisfy the **major requirement** by completing at least 15 units of work in one subject or field of concentration, in courses numbered 300 or above; and (c) complete at least 6 units of work in courses outside the subject or field of the major requirement. The degree will be granted when 60 units of work approved by the Faculty of Arts have been completed.

A typical Major Program is patterned as follows:

Third Year:

1. Course in Major subject or field of concentration.
2. Course in Major subject or field of concentration.
3. Elective course outside Major subject or field.
4. Elective.
5. Elective.

Fourth Year:

1. Course in Major subject or field of concentration.
2. Course in Major subject or field of concentration.
3. Course in Major subject or field of concentration.
4. Elective course outside Major subject or field.
5. Elective.

A student in the Major Program who plans, after obtaining the degree of Bachelor of Arts, to enter the secondary program (fifth year) of the Faculty of Education should consult the Student Programs Office of that Faculty (Scarfe 103).

Beginning the Major Program in the Second Year

Several departments (e.g. Asian Studies, Fine Arts, Geography, Hispanic & Italian Studies, Music, Philosophy, Slavonic Studies) permit qualified students to take 3 units of senior course work towards the major in the first 30 units. A student who chooses to begin the major program in the second year must complete at least 9 units of work in courses outside the subject or field of the major program in the final 30 units.

Double Major Program

Pre-requisites:

30 units of First and Second-Year credit including English 100, requirements in language, literature, and science, as well as pre-requisites for two majors in the Faculty of Arts.

Third and Fourth Year:

33 units. 15 units in each of two disciplines fulfilling the major requirements and 3 units of Third or Fourth-Year electives outside the subjects or fields of specialization.

Honours Program

On entering the Honours Program, the student must draw up a plan of study for the last 36 units of work in consultation with a departmental adviser. Prior to the final 18 units of the program, the student must have the program of study reviewed by a departmental adviser.

The departments that offer Honours Programs design their own programs. Such programs are open only to students who, in the opinion of the department, have shown special aptitude and the capacity to profit from working intensively in this subject or field. A student graduating from the Honours Program will be granted the degree, with First- or Second-Class Honours, when a total of 66 units of work, approved by the candidate's department and by the Faculty of Arts, has been completed. The student must have attained a minimum average of Second Class standing in the final 36 units of work in the Honours Program.

In the last 36 units of the Honours Program, a student must satisfactorily complete (a) *at least* 6 units of work in courses outside the subject or field of specialization and (b) *at least* 30 units of work in courses numbered 300 or above.

Students contemplating an Honours program are advised to complete Faculty requirements before entering the program.

Special Programs

In addition to the Major and Honours Programs described below, special Major and Honours Programs may be arranged by individual students allowing them to do work in several departments. Proposals for special programs must be approved by the Senior Faculty Adviser in consultation with the departments concerned.

COURSES IN OTHER FACULTIES OR DEGREE PROGRAMS

Not more than 6 units from the following list of special introductory courses offered by faculties other than the Faculty of Arts or by schools within the University may count toward the last 30 units (Major) or 36 units (Honours) of a student's program for the Bachelor of Arts degree:

Biology 310 (Human Heredity and Evolution)
Biology 311 (Ecology and Man)
Biology 313 (Microbes and Man)
Botany 310 (Plants and Man)
Commerce 457 (Introduction to Financial Accounting)
Commerce 458 (Introduction to Managerial Accounting)
Forestry 300 (Principles of Forestry and Wood Science)
Geology 310 (Canadian Geology)
Geophysics/Astronomy 310 (Exploring the Universe)
Family and Nutritional Sciences 303 (World Problems in Nutrition)
Family and Nutritional Sciences 351 (Human Physical Growth and Development)
Oceanography 310 (Man and the Oceans)
Physics 140 (Man's Energy Sources)
Physics 340 (Elements of Physics)
Planning 425 (Urban Planning)
Social Work 301 (Social Welfare in the Modern Era)
Social Work 302 (Family and Child Welfare in the Modern Era)
Soil Science 300 (Soil in Man's Environment)
Zoology 400 (Principles and History of Biology)

All courses in the **Faculty of Science** are accepted for credit toward the Bachelor of Arts degree, subject to the above limitation on credit for special introductory courses.

History of Medicine 400 and History of Medicine 401 (prerequisites: Biology 101 or 102) are accepted for credit towards the Bachelor of Arts degree.

All courses in the history, theory, and composition of Music are acceptable for credit toward the Bachelor of Arts degree. Courses in musical performance are not acceptable *except for* the ensemble courses Music 150-156, 159-165; a maximum of 3 units from these courses may count toward the degree.

No other courses in other faculties or degree programs may be taken as electives in a Bachelor of Arts program. However, students registered in a Major or Honours program leading to the Bachelor of Arts degree may, with the permission of the Department in which they are registered for that program, take up to 6 units in courses offered by other faculties or schools if the Department concerned agrees to accept such courses as part of the Major or Honours requirement (i.e., as part of the 15 or more units of work required in one subject or field of concentration). Whenever such permission is granted, the Department concerned must notify the Senior Faculty Adviser in writing before the permission takes effect.

PROGRAMS IN THE FACULTY OF ARTS

Below are described (a) programs of study in individual departments of the Faculty and (b) areas of interdisciplinary study offered in the Faculty. These descriptions contain the degree requirements for all the Major and Honours programs and all the Diploma programs of the Faculty, excluding those of the Schools of Family and Nutritional Sciences, Library, Archival and Information Studies, and Social Work. They also contain general information from departments of the Faculty about their particular course offerings, prerequisites, entry requirements, special fees, etc. Descriptions of all courses are given in the **Courses of Instruction** section of this calendar. In addition, some departments of the Faculty prepare their own brochures giving more detailed information about their course offerings each year. If available, these should be consulted.

It should be noted that there is no degree program (Major or Honours) in some of the areas of interdisciplinary study described below. Canadian Studies, for example, is simply a listing of courses offered in the Faculty that are significantly Canadian in content or approach.

ANTHROPOLOGY

The Department of Anthropology and Sociology offers programs of study that lead to the degrees of Ph.D., M.A., B.A. (See also Museum Studies.)

Requirements for the degree of Bachelor of Arts:

Major

Second Year:
Anthropology 200

Third and Fourth Years:
15 units in Anthropology and Sociology, including:
Anthropology 300
Three units from among Anthropology 400, 450, 460, 470
Three units from among Anthropology 302-304, 351-353, 401-405.
Other courses to be chosen in consultation with a departmental adviser.

Honours

Admission to Third Year:
High second-class average in first and second years
First-class standing in Anthropology 200 or Sociology 200

Admission or Continuation to Fourth Year:
High second-class average in the first three years and two first-class marks in courses in the major discipline

Third and Fourth Years:
18 units in Anthropology and Sociology, including:
Anthropology 300
Three units from among Anthropology 400, 450, 460, 470
Anthropology 449
Three units from among Anthropology 302-304, 351-353, 401-405. Other courses are to be chosen in consultation with an assigned adviser. Courses outside the department may be taken toward Honours credit with special permission.

Undergraduate Courses:

Anthropology 100, 200, 201, 202, 203, 206, 213, 214, 217, 220, 221, 240, 301, 320, 321, 322, 325, 329, 412 are general courses open to all students. Anthropology 301, 321, 322, 412 cannot be taken for Major credit.

Other courses listed in Courses of Instruction under "Anthropology" are intended primarily for students in the Major or Honours Program. Except for 300 and 449 these are open to non-Majors with appropriate prerequisites.

Anthropology 200 is a prerequisite to all courses in the department except those described above as "general," unless specific permission of the Department is obtained.

Native Peoples

Students who want to concentrate in the study of Indian and Inuit peoples and cultures may choose from among the following courses beginning in the second year:

Anthropology 220 (1½) Indians of British Columbia: Cultures and Resources
Anthroplogy 221 (1½) Indians of British Columbia: Art and Myth
Anthroplogy 301 (1½) Contemporary Indians of British Columbia
Anthroplogy 321 (1½) The Canadian Far West in Prehistory
Anthroplogy 304 (3) Ethnography of the Northwest Coast
Anthroplogy 329 (3) Native Peoples of Canada
Anthroplogy 401 (3) Indians of North America
Anthropology 420 (1½/3)**d** Archaeology of British Columbia

The following courses also regularly include material relating to native cultures:

Anthropology 331, 332, 341, 407, 408, and 424: Fine Arts 261, 369, and 469; History 302.

Students who want to major in Anthropology with an emphasis on Native Peoples of Canada may do so by completing Anthropology 300; 3 units from among Anthropology 400, 450, 460, 470; Anthropology 304 or 401; 6 or more units from among Anthropology 304, 329, 331, 401, 420 and 431.

Each May the Department issues a mimeographed pamphlet to inform students in detail about courses that will be offered the following September. Students should obtain a copy before choosing courses.

ARCHAEOLOGY

Students may emphasize archaeology both at the undergraduate and graduate levels by selecting courses offered in a number of departments at the University of British Columbia, especially the Departments of Anthropology and Sociology, Classics, Fine Arts, and Religious Studies. In each case, the Major or Honours program can be developed with an emphasis on archaeology. The University is strong in areas complementary to archaeology, such as ethnology, ecology, geography, geology, metallurgy, biology and quantitative methods; and students are urged to begin courses in these fields at an early date. They are encouraged to acquire a broad knowledge of different geographical areas, techniques and theories. Several possibilities are listed below under "Courses" and "Courses which are ancillary to Archaeology".

Within the **Department of Anthropology and Sociology,** the focus is on anthropological archaeology, cultural ecology, and the economic patterns of hunters and gatherers and agriculturalists. Instruction covers field techniques, analysis, and the study of various culture areas (such as Western North America, Oceania, and East and Southeast Asia) and includes a local field school and training in computer applications. The Museum of Anthropology offers extensive archaeological facilities and houses collections from various parts of the world.

Classical archaeology in the **Department of Classics** covers the art and cultural history of the Greek and Roman world from the Bronze Age to the founding of Constantinople. Though primarily descriptive, courses include a certain amount of archaeological material and method and discussion of relevant social and historical processes. Some attention is paid also to ancillary disciplines such as epigraphy and numismatics. There is a small teaching collection in the Museum of Anthropology.

The **Department of Fine Arts** offers a number of courses at the undergraduate and graduate level which depend to a greater or lesser extent on material deriving from archaeological work. Although these courses are not concerned with archaeological techniques as such, they may be of great value to the student as suggesting some of the ways in which archaeological findings contribute to the history of art, particularly in Asian Art, Medieval Art in Western Europe, and the Indigenous Arts of the Americas.

The **Department of Geography** offers courses of value to the archaeologist in a variety of fields. Research on wetland agriculture in Central America has been carried out for several years with student participation. In past years, students have undertaken combined programs with Anthropology in the fields of subsistence and cultural ecology.

The **Department of Religious Studies** offers courses at the undergraduate level in the Archaeology of the Ancient Near East (including Egypt), Biblical Archaeology, and the Art and Architecture of Islam (from an archaeological point of view).

The **Department of Geological Sciences** offers several courses that may prove of value to the student of archaeology, particularly in the fields of mineralogy, and analysis of materials.

Courses in **Biology, Botany, and Zoology** which deal with the basic structures and functions of the plants and animals found in archaeological sites are also listed below.

Courses:

Anthropology 203: Introduction to Anthropological Archaeology
Anthropology 204: Introduction to Classical Archaeology
Anthropology 205: Introduction to Historical Archaeology
Anthropology 305: Theory in Archaeology
Anthropology 306: Summer Field Training in Archaeology
Anthropology 320: Prehistory of the Old World
Anthropology 321: The Canadian Far West in Prehistory
Anthropology 322: Archaeological Foundations of East and Southeast Asian Civilizations.
Anthropology 406: Laboratory Techniques in Archaeology
Anthropology 410: Prehistory of a Special Area (Usually Asia and the Pacific or North America).
Anthropology 420: Archaeology of British Columbia
Anthropology 424: Applied Archaeology
Anthropology 433: Directed Studies
Anthropology 449: Honours Tutorial
Anthropology 451: Conservation of Inorganic Materials
Anthropology 452: Conservation of Organic Materials
Anthropology 510: Comparative and Developmental Studies in Archaeology.
Anthropology 517: Archaeological Methods.
Anthropology 520: Advanced Prehistory
Anthropology 527: Advanced Archaeological Methods.

Classical Studies 204: Introduction to Classical Archaeology
Classical Studies 330: Greek and Roman Art (also listed as Fine Arts 329)
Classical Studies 429: Studies in the Art and Archaeology of Greece and Rome (also listed as Fine Arts 429)
Classical Studies 430: Athens and Rome (Archaeology and topography).

Religious Studies 300: Archaeology of the Ancient Near East (also listed as Fine Arts 327)

Religious Studies 306: Archaeology and the Bible
Religious Studies 341: Islamic Art and Archaeology (also listed as Fine Arts 359)

Courses Which are Ancillary to Archaeology

Anthropology 240: Introduction to the Study of Human Evolution
Anthropology 300: Course and Seminar in Social Organization (for anthropology majors only)
Anthropology 325: Introduction to Physical Anthropology
Anthropology 425: Survey of Non-Human Primates
Anthropology 431: Museum Principles and Methods
Anthropology 460: Cultural Ecology and Cultural Evolution
Anthropology 515: Cultural Evolution and Cultural Ecology

Biology 101 or 102: Principles of Biology

Botany 209: Non-Vascular Plants
Botany 210: Vascular Plants
Botany 310: Plants and Man
Botany 311: Classification and Identification of Seed Plants
Botany 441: Paleobotany
Botany 442: Palynology

Fine Arts 251: Aspects of Asian Art
Fine Arts 261: Native Arts of the Americas

Fine Arts 331: Early Medieval Art
Fine Arts 333: Architecture of the High Middle Ages
Fine Arts 351: History of Early Chinese Art
Fine Arts 353: Buddhist Art of Japan
Fine Arts 355: Art of India and Southeast Asia
Fine Arts 361: Pre-colonial Art of South America
Fine Arts 363: Arts of the Aztecs and their Predecessors
Fine Arts 365: Dynastic Arts of the Classic Maya
Fine Arts 369: North American Indian Art

Geography 101: Introduction to Physical Geography
Geography 308: Quarternary and Applied Geomorphology
Geography 315: Environmental Inventory and Classification
Geography 317: The Physical Environment of British Columbia
Geography 324: Cultural Geography
Geography 370: Air Photograph Analysis
Geography 372: Cartography
Geography 418: Environmental Change
Geography 495: Geography of Latin America

Geology 105: Physical and Historical Geology
Geology 200: Minerology I
Geology 201: Minerology II
Geology 206: Stratigraphy
Geology 226: Sedimentology
Geology 256: Stratigraphy and Sedimentology
Geology 302: Igneous Petrology
Geology 321: Paleontology I
Geology 421: Paleontology II

Zoology 203: Comparative Vertebrate Zoology
Zoology 205: Comparative Invertebrate Zoology

ARTS ONE

Students entering the first year may enrol in Arts One, a nine-unit program of liberal education. Arts One is organized in teaching groups, each consisting of a maximum of 100 students and five faculty from various university departments, who address themselves to a year's study of themes of basic human concern. The aim of the curriculum is to provide a coherent focus for the student's attention throughout the year. The impact of the program, made possible by the ratio of faculty to students, comes through weekly lectures, seminars, tutorials, individual conferences, and a variety of cultural activities such as weekend symposia, field trips, visits to plays, films, and art exhibitions. A sense of membership in a community of learners is created through use of the Arts One Building, located near the centre of the campus.

For the students enrolled, Arts One satisfies the Faculty of Arts requirement for first-year English and the departmental requirements for first-year History and Philosophy. Arts One also satisfies some of the Faculty of Education requirements for first year. Any Education student registering in Arts One should first consult his/her adviser in that faculty.

Students enrolled must also take six units of regular course work. On successful completion of Arts One and the two regular courses, students receive second-year standing in the university. Owing to the nature of the course, supplemental examinations will not be given in Arts One.

Students who enrol in Arts One are expected to remain in it for the complete session, but they may drop the program without penalty during the period officially allowed for course changes.

Information about Arts One and appointments for counselling concerning the program can be obtained from the Secretary, Arts One (228-3430). Students wishing to enrol in Arts One should complete the pre-registration form for the program mailed out with registration material. We request that the pre-registration form be returned to the Arts One Office before the first day of Registration. Enrolment in Arts One is on a first-come first-served basis; a student not submitting a form will be accommodated, space permitting. Registration for Arts One is accomplished in the same way as registration in other courses in the Faculty of Arts.

ASIAN AREA STUDIES

Students who want to do graduate work with a concentration in the Asian field are required to take at least nine units in one discipline (e.g., History, Political Science, Geography, Anthropology).

Requirements for the degree of Bachelor of Arts:

Major

First and Second Years:
One of Asian Studies 105, 115, 206

Other recommended courses:
Anthropology 100, Economics 100, Fine Arts 251, History 100-199, Political Science 280, Religious Studies 204.

Third and Fourth Years:
Students must follow one of the following area programs:

A. Program in East Asia

Chinese 100 and 101, or Chinese 180, or Japanese 100 and 101, or Japanese 102 and 103, or Japanese 180 (6 units)
(Students must take either Basic Chinese or Basic Japanese; they are urged to take it in their first or second year, but upper-year credit will still be given if they take it later)
(Consult the Department of Asian Studies concerning courses in Korean for 1986-87).

3-6 units from:
Asian Languages 300 (3)
Asian Languages 400 (3)
Asian Studies 302 (3)
Asian Studies 325 (3) (= Philosophy 323)
Asian Studies 335 (3)
Asian Studies 365 (1½) (= Religious Studies 365)
Asian Studies 366 (1½) (= Religious Studies 366)
Asian Studies 370 (3)
Asian Studies 375 (3)
Asian Studies 415 (3)
Asian Studies 430 (3) (= Religious Studies 430)
Asian Studies 435 (3)
Chinese courses numbered 200 and above
Fine Arts 351 (3)
Fine Arts 352 (3)
Fine Arts 353 (3)
Fine Arts 354 (3)
Fine Arts 356 (3)
Fine Arts 451 (3)
Fine Arts 453 (3)
Japanese courses numbered 200 and above
Religious Studies 361 (1½)
Religious Studies 364 (1½)
Religious Studies 460 (3)
Religious Studies 461 (1½)
Theatre 340 (3)*

3 units from:
Asian Studies 320 (3) (= History 382)
Asian Studies 321 (3) (= History 381)
Asian Studies 330 (3) (= History 383)
Asian Studies 423 (3)
Asian Studies 450 (3) (= History 482)
History 309 (3) (= Asian Studies 309)
History 380 (3) (= Asian Studies 380)
History 422 (3) (= Asian Studies 422)
History 423 (3)
History 480 (3) (= Asian Studies 480)

3 units from:
Anthropology 322 (1½)
Anthropology 352 (1½)
Anthropology 402 (1½/3)
Anthropology 410 (3) (by permission)*
Asian Studies 405 (3)
Asian Studies 417 (3) (= Political Science 424)
Economics 341 (1½)
Economics 342 (1½)
Geography 385 (1½)
Geography 386 (1½)
Geography 425 (1½)
Geography 481 (1½)
Political Science 321 (3)
Political Science 322 (3)
Political Science 365 (1½/3)

*Only when the area covered in the course is East Asia, will the Department of Asian Studies grant permission to take the course as a part of the (East) Asian Area Studies major program.

Additional courses should be chosen in consultation with an adviser; at least 6 units must be outside the Asian field.

B. Program in South Asia

Students must take 6 units of work in one Indic language (Hindi 300 and 400; or Sanskrit 305 and 414.) Students having knowledge of another language closely related to Hindi may be required to complete Hindi 310 and one upper-year course in Hindi/Urdu instead of Hindi 300 and 400 respectively.

3-6 units from:
Asian Studies 345 (3)
Asian Studies 350 (3)
Asian Studies 355 (3)
Fine Arts 355 (3)
Fine Arts 356 (3)
Fine Arts 455 (3)
Hindi 405 (3)
Hindi 410 (3)
Indic Languages 440 (3-6)
Religious Studies 354 (3)
Religious Studies 364 (1½)
Religious Studies 452 (3)
Sanskrit 424 (3)
Theatre 340 (3)*
Urdu 401 (3)

3-6 units from:
Asian Studies 340 (3)
Asian Studies 420 (3)
Asian Studies 438 (1½)
History 385 (3) (= Asian Studies 385)
History 387 (1½)
History 388 (1½)

3-6 units from:
Anthropology 302 (1½)
Anthropology 403-5 (1½/3) (by permission)*
Asian Studies 450 (3)
Geography 386 (1½)
Geography 483 (1½)
Political Science 323 (3)

*Only when the area covered in the course is South Asia will the Department of Asian Studies grant permission to take the course as a part of the (South) Asian Area Studies major program.

Additional courses should be chosen in consultation with an adviser; at least 6 units must be outside the Asian field.

C. Program in Southeast Asia

3-6 units from:
Asian Studies 450 (3)
Fine Arts 355 (3)
Fine Arts 356 (3)
History 309 (3) (= Asian Studies 309)
History 434 (3) (= Asian Studies 434)
Theatre 340 (3)*

3-6 units from:
Anthropology 303 (1½/3) (by permission)*
Anthropology 322 (1½)
Anthropology 403-5 (1½/3) (by permission)*
Anthropology 410 (3) (by permission)*
Economics 341 (1½)
Geography 386 (1½)
Geography 468 (1½)
Geography 484 (1½)
Political Science 324 (3)

*Only when the area covered in the course is Southeast Asia, will the Department of Asian Studies grant permission to take the course as a part of the (Southeast) Asian Area Studies major program.

Additional courses should be chosen in consultation with an adviser; at least 6 units must be outside the Asian field.

ASIAN STUDIES

The Department of Asian Studies offers programs of study that lead to the degrees of Ph.D. (Chinese and Japanese and South Asian Studies only), M.A., B.A.

The courses offered at the undergraduate level fall into two categories: (a) courses on the contemporary and historical cultures of South, Southeast, and East Asia, which do not require knowledge of an Asian language (these are listed under the heading Asian Studies); and (b) courses in language, including advanced reading courses, which introduce the student to literary, philosophical, and historical works in their original language (these courses are listed under the specific language headings). Courses in category (a) are open to all students in the Faculty of Arts. Courses in category (b) are mostly designed to provide the essential training for those who wish to proceed to further scholarly studies in the field of Asian Studies at the graduate level, but, in the more elementary courses, language training at the appropriate level is also provided for those who wish to obtain some knowledge of Chinese, Japanese, or Indic languages as part of their general education or with a view to later practical use. (Courses in Korean may be available in 1986-87; consult the Department.)

The Department offers Honours and Major Programs in Chinese and Japanese and, in cooperation with other departments, a Major Program in Asian Area Studies which requires less in the way of language study.

Because of the special difficulty of mastering Chinese and Japanese arising from the nature of the script, it is strongly recommended that those who intend to do graduate work in any field which will require the use of these languages should begin their study of them at the earliest possible moment. The Honours Programs are designed to give students the necessary preparation, but students may still find that their graduate programs take longer in Asian Studies than in other fields. Students who do not take the full amount of language training provided by the Honours Programs must, of course, expect to have to make this up before being regarded as fully qualified for graduate work, and to spend still longer periods of time before obtaining higher degrees.

The Department at the same time recognizes that students often develop an interest in Asian Studies when it is too late to embark on an Honours or Major Program in Chinese or Japanese. The Department will, therefore, arrange special intensive programs of language training on a tutorial basis, or by a combination of classes and supervised study, for students who are otherwise well-qualified for graduate studies either in the Asian Studies Department or in other departments such as History, Political Science, Anthropology, Fine Arts, etc.

Graduate credit in Asian Studies will not normally be given for the work done in such a program. Students in other disciplines should consult the departments concerned as well as the Department of Asian Studies.

Attention is also drawn to the possibility of arranging a joint M.A. program in Asian Studies and another department.

Requirements for the degree of Bachelor of Arts:

Major in Asian Studies
See **ASIAN AREA STUDIES**

Major in Chinese
First and Second Years:
Chinese 100, 101, and 200 and either 201 or 301. Asian Studies 105 is recommended. Chinese 180 is equivalent to Chinese 100-101 and 280 to 200-201.
Third and Fourth Years:
9-12 units in courses in Chinese numbered 300 and above, which must include Chinese 300/305, 301 (if not already taken in the first two years), and a 400-level course.
3-6 units in Asian Studies courses on China numbered 300 and above

Major in Japanese
First and Second Years:
Japanese 100 and 101, or 102 and 103, 200 and 201. Asian Studies 105 is recommended. Japanese 180 is equivalent to Japanese 100-101 or 102-103, and Japanese 280 to 200-201.
Third and Fourth Years:
9-12 units in courses in Japanese numbered 300 and above
3-6 units in Asian Studies courses on Japan numbered 300 and above

A double major in Chinese and Japanese is possible, but will probably require more than four years. Students interested in a double major should seek departmental advice at an early stage.

Honours in Chinese (Japanese)
Admission:
As for Major in Chinese (Japanese) with First or high Second-Class standing. Asian Studies 105 is recommended.
Third and Fourth Years:
18 units in Chinese (Japanese) numbered 300 or above (including 342 and 442)
12 units from Asian Studies courses selected in consultation with the Department

In addition to the cross-listed courses bearing on China and Japan the following courses will be accepted as Asian Studies courses for Majors or Honours in Chinese and Japanese, *subject to the approval of the Department:*

Anthropology 322: Archaeological Foundations of East and Southeast Asian Civilizations.
Anthropology 352: Ethnography of East Asia.
Anthropology 402: Ethnography of China.
Anthropology 403-5: Comparative Ethnography of Special Areas (when the area covered is Japan).
Anthropology 410: Prehistory of a Special Area (when the area covered is China or Japan).
Economics 341: Economic Development of Asia.
Economics 342: The Economy of China since 1949.

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Fine Arts 351: History of Early Chinese Art.
Fine Arts 352: History of Chinese Painting.
Fine Arts 353: Buddhist Art of Japan.
Fine Arts 354: Japanese Painting Traditions.
Fine Arts 451: Seminar in Chinese Painting.
Fine Arts 453: Seminar in Japanese Art.
Geography 385: Geography of China.
Geography 386: Introduction to the Geography of Monsoon Asia.
Geography 425: Landscape and Life in Imperial China.
Geography 468: Geography of International Economic Systems.
Geography 481: Geography of Japan.
History 423: Economic and Business History of Modern Japan.
Political Science 321: Chinese Government and Politics.
Political Science 322: Japanese Government and Politics.
Political Science 365: Asian International Relations (when the area covered is China or Japan).
Political Science 421: Advanced Topics in Comparative Politics (Non-Western) (when the area covered is China or Japan).
Religious Studies 361: The New Religions of Japan.
Religious Studies 364: Buddhism in India and East Asia.
Religious Studies 431: The Buddhist Relious Tradition.
Theatre 340: History of the Oriental Theatre (when the course deals with China or Japan).

Note: A brochure describing the offerings of the Department of Asian Studies in more detail is available from the departmental office.

CANADIAN STUDIES

The following courses in the Faculty of Arts are called to the attention of those students with a special interest in Canadian Studies, whether as part of a major program or as electives. The courses listed have been suggested by the Departments concerned as having a significantly Canadian content or approach. Students desiring to enrol in any of these courses or to get further information about them should consult the Departmental Advisers.

Anthropology 201, 220, 221, 300, 301, 304, 321, 329, 331, 332, 401, 420.
Economics 254, 336, 345, 350, 355, 360, 361, 370, 371, 374, 384, 447, 450, 456, 460, 461, 465, 466, 471, 472, 475, 480.
English 202, 317, 420, 421, 423, 424, 426, 429, 438, 440, 446.
Fine Arts 343, 348, 369, 443.
French 335, 403, 416, 419, 421.
Geography
(a) Mainly Canadian content: 190, 317, 327, 328, 427, 450, 491, 497, 499.
(b) Significant Canadian content: 110, 205, 220, 260, 315, 350, 360, 361, 370, 415, 417, 423, 424, 453, 461, 464, 467, 468, 470.
History 135, 201, 205, 303, 307, 326, 329, 401, 404, 420, 426, 430, 437, 439.
Linguistics 433, 440, 445.
Political Science 200, 301, 302, 303, 304, 305, 306, 363, 401, 402, 403, 404, 405.
Religious Studies 420.
Sociology 210, 310, 410, 425, 453, 470.

CHINESE — see Asian Studies.

CLASSICAL STUDIES

The Department of Classics offers a Major Program (not an Honours) in Classical Studies.

Requirements for Major in Classical Studies:

Second Year:
Classical Studies 310 or 330 or 331.

Third and Fourth Years:
15 units of Classical Studies courses numbered 300 or above (which must include 310, 330 and 331 if not already taken). Classical Studies 305 is highly recommended. Those who wish to concentrate on art/archaeology should take Classical Studies 429 and 430; on literature, Classical Studies 315 and 316; on history, two or more of Classical Studies 332, 333, 433, and 435. Greek or Latin courses numbered 300 or above may be substituted for 6 of the 15 units of Classical Studies. Religious Studies 300 and Philosophy 333 and 343 are accepted within the Classical Studies Major.

Note: A knowledge of the Greek and Latin languages is not required for any of the courses in Classical Studies. These courses are designed to investigate the life, literature and thought of the Greek and Roman world. Classical Studies 204, 210, 305, 310, 315, 316, 330 and 331 may be taken by second-year students. The Department of History recognizes Classical Studies 331, 332, 333, 433 and 435 as history courses (although only one may be credited toward a Major in History). Three units of credit in Fine Arts will be given for each of Classical Studies 330 and 429. Classical Studies 310, 315 and 316 are acceptable alternatives to English at the 200 level, except for students majoring in Classical Studies. Classical Studies 436 is recognized by the Department of Philosophy towards its Major.

CLASSICS

The Department of Classics offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Requirements for the degree of Bachelor of Arts:

Major in Classical Studies: see CLASSICAL STUDIES.

Major in Greek
Classical Studies 331 (preferably in the second year)
15 units of Greek numbered above 300; for 3 of these, a course in Latin or in Classical Studies numbered above 300 may be substituted.

Major in Latin
Classical Studies 331 (preferably in the second year)
15 units of Latin numbered above 300; for 3 of these, a course in Greek or in Classical Studies numbered above 300 may be substituted.

Honours in Classics:
Prerequisites: Greek 200, Latin 205, Classical Studies 331. Latin 301 may be substituted by permission of the departmental Honours Adviser.

Third and Fourth Years:
30 units in Greek and Latin courses numbered 300 and above, which must include either Latin 410 (composition) or Greek 410 (composition). Students preparing for admission to a graduate program in Classics should take both Greek 410 and Latin 410 (offered in alternate years).

The Department is prepared to arrange Honours programs in collaboration with other departments (e.g., French, Hispanic and Italian Studies, English).

COMPARATIVE LITERATURE

A program of study is offered that leads to the degrees of Ph.D., M.A.

Undergraduates who might be interested in preparing for the M.A. program are advised to enrol in the Major or Honours program of one of the literature departments, and meanwhile to consult the Chairman of the Comparative Literature Committee at the earliest opportunity for suggestions about the choice of elective subjects. While the greatest stress is laid upon the advanced study of literature in the original languages, attention should also be paid to such courses as Asian Studies 302, 335, and 345, Classical Studies 310, 315 and 316, Creative Writing 415, English 310, 311, 316, 317, 319, 331, 332, 420, 424 and 440, French 400, Germanic Studies 201, 301, 303 and 411; Italian Studies 310; Medieval Studies 200; Slavonic Studies 206, 306, 307 and 308; Theatre 310, 320, 340 and 430 and Women's Studies 224. The graduate seminars in Comparative Literature are open to suitably qualified fourth-year undergraduates by permission of the instructor. For further information see Professor Lorraine Weir, Chairman, Program in Comparative Literature (Buchanan E 270).

CREATIVE WRITING

The Department of Creative Writing offers programs of study that lead to the degrees of M.F.A. (including interdepartmental programs in cooperation with the Department of Theatre) and B.F.A.

Requirements for the degree of Bachelor of Fine Arts:

Major

First or Second Year:
Creative Writing 202 or 301.

Subsequent Years:
18 units. Students may select 3 of these units from courses outside the department in consultation with their adviser. At least 15 units will be chosen in consultation with their adviser from departmental workshops and tutorials and must include:

1. Any three of the following workshops*:
Creative Writing 403 (Writing of Children's Literature)
Creative Writing 404 (Radio Plays)
Creative Writing 405 (Non-fictional Prose)
Creative Writing 406 (Screen and Television Plays)
Creative Writing 407 (Stage Plays)
Creative Writing 408 (Novel and Novella) or
Creative Writing 409 (Short Story)
Creative Writing 410 (Poetry)
Creative Writing 415 (Translation)

*In satisfying the program's three-genre requirement, 408 and 409 are treated as a single genre: fiction.

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2. One or more of the following tutorials in areas of the student's special interest:
   Creative Writing 447 (Directed Reading) — not necessarily offered every year.
   Creative Writing 491 (The Writing of Children's Literature)
   Creative Writing 492 (Non-fictional Prose)
   Creative Writing 493 (Radio Plays)
   Creative Writing 494 (Screen and Television Plays)
   Creative Writing 495 (Translation)
   Creative Writing 496 (Poetry)
   Creative Writing 497 (Fiction)
   Creative Writing 498 (Stage Plays)

Admission to courses.

Students from any faculty may apply, but each course is restricted to fifteen students. Applicants for Creative Writing 202 will be admitted if the applicant's submission of 20-25 pages of recent original fiction, imaginative non-fiction, drama, or poetry, or a combination of these, is judged acceptable by the Department. Admission to Creative Writing 301 may be obtained by interview with the instructor. A manuscript may be required. Applications should reach the Department by August 15.

Students wishing to major in Creative Writing should apply at the end of their second year of university by submitting to the department a written request accompanied by their second year's creative writing manuscripts. Applicants will be accepted as majors on the recommendation of their 202 instructor and of the instructors assigned to evaluate their submission. Students who have not completed the department's 202 or 301 and who wish to be considered for a major in Creative Writing should submit 30-35 pages of original writing in two or more genres. Students who have not completed the department's 202 or 301 and who wish to be considered for a particular 400-level course but not for a major in Creative Writing should submit 20-25 pages of original writing relevant to that course. Applicants interested in 404, 406 or 407 may submit fiction or plays.

Instruction

Instruction is based on the premise that promising student-authors can benefit from professional criticism and the necessity of producing regularly and meeting deadlines. Workshops, conferences and tutorials are designed to focus attention on the student's own work. Reading assignments may be made in the Department's magazine of current writing, *PRISM international,* and other relevant journals and books. There are no examinations, and marks are based on the writing done and on participation in workshops throughout the year.

ECONOMIC HISTORY

The Departments of Economics and History jointly offer a program in economic history designed to provide a common core of training for Economic History students in both departments, while also permitting a measure of specialization in either of the two parent disciplines. Students may enrol in a Major Program in Economics (Economic History) or History (Economic History), or an Honours Program in Economics (Economic History).

Students planning to enrol in these programs should consult Professor Paterson.

Requirements for the Degree of Bachelor of Arts.

Major in Economics (Economic History)
Mathematics 140 and 141
Economics 100
6 units from any of the 100 or 200-level courses in History.
Economics 201 and 202, or 206 and 207, or 301 and 302.
Economics 325 and 326
One of: Economics 334, 336, 437
Economics 490
3 units from Economics courses numbered 400 or higher (not to include Economics 437 or 490)
3 units of courses in Economic History (from the joint list)
3 units of courses in History at the 200-, 300- or 400-level (may include courses on the joint list offered by the Department of History).

Honours in Economics (Economic History)
Mathematics 140 and 141
Economics 100
6 units from any of the 100 or 200-level courses in History.
Economics 206 and 207, or 201 and 202, or 301 and 302
Economics 306 and 307
Economics 325 and 326
One of: Economics 334, 336, 437
Economics 495 and 499
3 units from Economics courses numbered 400 or higher (not to include Economics 437, 495 or 499)
3 units of courses in Economic History (from the joint list)
3 units of courses in History at the 200-, 300- or 400-level (may include courses on the joint list offered by the Department of History)
Mathematics 200 and 221 are recommended, but not required.

Major in History (Economic History)
Mathematics 140 and 141
Economics 100
6 units from any of the 100- or 200-level courses in History.
Economics 201 and 202, or 206 and 207, or 301 and 302.
Economics 325 and 326
15 units of History, including at least 6 units in Economic History taken from the joint list of courses below.
6 units of Economics courses numbered 300 or greater.

Joint List of Courses in Economic History
History 371 (3) Economic History of Europe to 1750
History 418 (3) Economic and Social History of Industrial Britain, 1660-1830
History 423 (3) Economic History of Modern Japan
History 431 (3) Population in History
Economics 334 (3) Economic Development of Modern Europe
Economics 336 (3) Economic History of Canada
Economics 341 (1½) Economic Development of Asia
Economics 342 (1½) The Economy of China since 1949
Economics 437 (3) Economic History of the United States
Economics 490 (3) Applied Economics (may be taken by students in the History (Economic History) major program in those years in which a section of Economics 490 discusses topics in economic history).

ECONOMICS

The Department of Economics offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Requirements for the degree of Bachelor of Arts:

Major
Mathematics 140 and 141
Economics 100
Economics 201 and 202, or 206 and 207, or 301 and 302.
Economics 325 and 326
One of: Economics 334, 336, 437
Economics 490
Another 3 units in Economics at the 400-level
Another 3 units in Economics at the 300- or 400-level
Mathematics 200 and 221 are recommended, but not required.

Students should note the prerequisites for the more senior courses and plan their programs accordingly. Mathematics 140 **and** 141 should normally be taken in the first year. Economics 100 may be taken in the first or second year. Courses at the 400-level are not normally offered outside the regular winter session; thus Economics 201, 202, 325, and 326 (or their equivalents), which may be taken in second year, must be successfully completed *before* the beginning of the student's final year.

Honours
Mathematics 140 and 141
Economics 100
Economics 206 and 207 (or Economics 201 and 202 with permission of the Department)
3 additional units of Advanced Economic Theory (as approved by Honours Adviser)
Economics 325 and 326
One of: Economics 334, 336, 437
Economics 495 and 499
Another 3 units in Economics at the 400-level
Another 3 units in Economics at the 300- or 400-level
Mathematics 200 and 221 are strongly recommended.
To be admitted to the Honours Program students must attain second-class standing or better in Economics 100 and 206 and 207, or 201 and 202, if attempted, and an overall second-class standing or better.
To continue in the Honours Program, students must attain at least a second-class average in all courses taken in Economics. Students considering taking the Honours Economics Program should consult the Department's adviser for Honours students.

Major and Honours Programs in Economic History

Students may also elect a Major or Honours Program in Economics (Economic History), offered jointly by the Departments of Economics and History. For descriptions of these programs see **ECONOMIC HISTORY** (above).

Courses for Students not Specializing in Economics:

Economics 309 is designed for upper-year students who want a survey course in economics but who do not want to specialize in the field. Economics 309 may replace Economics 100 as a prerequisite to other 300- and 400-level courses.

Non-specialists should also note that most 300-level courses have as prerequisites no more than Principles of Economics (Economics 100 or 309).

Students are referred to the Department of Economics *Undergraduate Handbook* for updated information on courses to be offered each session.

ENGLISH

The Department of English offers programs of study that lead to the degrees of Ph.D., M.A., B.A. The Department offers Honours and Major programs in English with emphasis in either Literature or Language and a special program for intending Secondary School English Teachers.

In March, the Department circulates its own booklet, *English Courses Offered,* which gives detailed information about the courses to be offered in the next academic year. This booklet states the unit-value of courses listed in the Calendar with variable unit credit. Interested students should write to the Department for a copy of *English Courses Offered.*

English 100 and Third-Year standing are prerequisite to all English courses numbered 304 or above except as noted. The designation "(1½-3)" means that the Department will offer the course at some times for one term (1½ units) and at other times for a full year (3 units).

Requirements for the degree of Bachelor of Arts:

Major

Second year:

English 201 (or under special conditions 450 or 210: see *English Courses Offered* for details.)

Third and Fourth Years:

Students who enrolled in the Major Program before January 14, 1983, may follow the requirements listed in the 1982-83 Calendar; students who entered the Major Program after January 14, 1983, must choose either the Literature Emphasis Program *or* the Language Emphasis Program.

Requirements for the Literature Emphasis Program:

1. At least 15 units in courses numbered 304 and above.
2. Of these 15 units, at least 12 units must be completed in areas 1-9 (listed below).
3. These 12 units must be distributed to cover 5 areas, as follows:
   a) At least 1½ units in each of 3 areas chosen from areas 1-5.

      and

   b) At least 1½ units in each of 2 additional areas chosen from areas 1-9.
      1. Old and Middle English (includes Chaucer): 340, 341, 350's.
      2. Sixteenth Century (includes Shakespeare): 360's.
      3. Seventeenth Century (includes Milton): 370's excluding 373.
      4. Eighteenth Century: 380's and 373.
      5. Nineteenth Century: 390's.
      6. Twentieth-Century British and Anglo-Irish: 400-416.
      7. American: 430-437.
      8. Canadian and Commonwealth: 420-429; 440, 446.
      9. Criticism, Bibliography, and Special Studies*: 310-319; 330-337; 438; 450.
      10. English Language and Rhetoric: 304; 306, 307; 320-329;

* Special studies courses sometimes fit into areas 1-8; consult current *English Courses Offered* for area designation of these courses in a given year.

Requirements for the Language Emphasis Program:

At least 15 units distributed as follows:

1. 320 and 329 (3 units each).
2. At least 3 units from the following list: 340, 341, 350, 351, 352, 353, 355.
3. At least 6 more units from the following list: 304, 306, 307, 322, 323, 324, 325, 326, 340, 341, 350, 351, 352, 353, 355, and Linguistics 300, 301, 319, 427.

(Linguistics 200 is recommended as preparation for English 329.)

The requirements for the English Major may now be completed through part-time study. Further details are available in *English Courses Offered.*

Honours

Admission

First or high Second Class normally in English 201; or First or high Second Class in both English 210 and English 211. For admission requirements to English 210 see course listing.

Third and Fourth Years:

At least one course must be taken in each of the following areas; at least two of the courses must be full-year or three-unit courses.

1. Language: 320 (3); 329 (3); 340 (1½)
2. Chaucer: 355 (3); 356 (1½)
3. Shakespeare: 365 (3); 367 (1½)
4. Milton: 375 (3); 376 (1½)

In addition, students are required to take 490 or 491 in their third year, and 492 and 499 in their fourth year. 36 units are required in the third and fourth years: at least 27 units in English courses and at most 30 units.

Special Program for Intending Secondary School English Teachers

The program requires 6 units of English in the second year and 18 units in the third and fourth years combined.

Second Year:
English 201 (Major Authors)
English 202 (Canadian Literature)
Third and Fourth Years:
English 304 (Advanced Composition)
English 329 (Modern English and its Background)
To be taken in the third year
English 330 (1½-unit seminar in Practical Criticism)
English 365 (Shakespeare)
Three units of pre-1800 literature
One survey course (3 units) in the 19th or 20th centuries (British or American literature).

Students in the Special Program are advised to include a course in Biblical and Classical Backgrounds in their undergraduate program (e.g., English 203, English 311, Classical Studies 310). English 203 (Biblical and Classical Backgrounds) may be substituted for English 202 in the second year provided English 420 (Canadian Literature) is taken in the third or fourth year. In the third year, Creative Writing 301 (Writing Techniques) may be substituted for English 304 provided an English course in the literature of the 17th to the 20th centuries is added to the normal requirements of the program.

Interested students should consult the Faculty of Education before entering this program, because there may be some restrictions in enrolment.

ETHNIC STUDIES

Ethnic Studies here refers to the study of ethnic groups within Canadian society. Work ordinarily centres on a single ethnic group, on relationships between ethnic groups, or on a comparison of the situations of such groups in Canada and in other countries. Ethnic Studies involve many disciplines (e.g., history, political science, anthropology, sociology, language, literature, health, education) and are carried on in various departments, schools, and faculties of the university. Subjects may vary widely (e.g., from ethno-musicology to nutrition) and are frequently studied on an inter-disciplinary or inter-faculty basis.

Although there is no Department of Ethnic Studies and no formal program leading to a degree in this field, many departments offer courses relevant to Ethnic Studies and related areas. Students who wish to emphasize Ethnic Studies at the undergraduate or graduate level will usually be registered in a single department and follow a normal degree program. Such students should consult the Committee on Ethnic Studies for guidance in planning their course-work; they should do so by the end of their second year. The Chairman of the Committee is Dr. J. R. Wood (Department of Political Science) tel. 228-4359.

FINE ARTS

The Department of Fine Arts offers programs of study that lead to the degrees of Ph.D., M.A., M.F.A., B.A., B.F.A. and the Diploma in Art History. It offers two courses of study with one common goal: the development of critical approaches to visual art. This may be pursued for purposes of general education or for professional activity in the fields of art, and the available programs reflect both the areas of focus and the depth of concern. In art history, the Department offers the degrees of B.A. (Major and Honours), M.A. and Ph.D. A Diploma in Art History is available for students who have a first degree in another discipline and who wish a foundation in art history for their own purposes. In studio art, the B.F.A. and M.F.A. degrees are offered. Depending upon the purposes of the student and the nature of the program, however, the student can give some attention to both art history and studio art. Brochures which introduce art history and studio goals, programs, and courses are available from the Department.

Requirements for the degree of Bachelor of Arts:

Major

First and Second Years:

Any 6 units in Fine Arts, of which at least 3 units must be in art history.

Third and Fourth Years:

9 units of Fine Arts courses numbered 300 or above in one of the following 3 areas:

a) Western art and architecture
b) Indigenous art of the Americas, or
c) Asian art.

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See the departmental art history brochure and consult with an adviser for courses in these areas.

6 additional units in Fine Arts courses numbered 300 or above which must include at least 3 units in Indigenous art of the Americas or Asian art courses for students in Western art, or 3 units in Western art for students in Indigenous art of the Americas or Asian art. Students, especially those who are contemplating graduate work, should include at least 3 units of fourth-year seminar courses in the minimum requirements for the Major. No more than 3 units of cross-listed courses offered by other departments, excepting Fine Arts 329, may be counted toward the minimum requirements for the Major.

Honours

First and Second Years:

Any 6 units in Fine Arts, of which 3 units must be in art history and in which First or Second Class standing must be obtained.

Third and Fourth Years:

Same requirements as for the Major, with the exception that 3 additional units in art history at the 300-level or above and the Honours Essay (Fine Arts 499) are required in addition, for a total of 36 units in the third and fourth years.

A reading knowledge of at least one language other than English, appropriate to the field of study, is strongly recommended.

Requirements for the degree of Bachelor of Fine Arts:

The program leading to the B.F.A. degree normally consists of four years of study. The first year is in fact the first year of the B.A. program. Application to enter the B.F.A. program proper is to be made by March 31 of the student's first year. The number of places available in the program is strictly limited, hence entry into the program is by selection. Unsuccessful applicants will be able to continue into the second year of the B.A. program. In exceptional circumstances, candidates will be considered at the end of the second year of the B.A. program. Students who have been admitted to the B.F.A. program may revert to the B.A. program if this is advisable at the end of the second year.

Prospective candidates may obtain details concerning the principles and procedures governing the selection of students from the Department of Fine Arts.

First Year:

Requirements of First Year B.A., including Fine Arts 181 and 3 units of art history with Second Class standing.

Second Year:

Requirements of Second Year B.A., including Fine Arts 281 (1½ units) and 4½ units from Fine Arts 282-290.

Third Year

At least 18 units in courses in the Faculty of Arts numbered 300 and above, including Fine Arts 380 (3 units), 6 units chosen from Fine Arts 381-385, and Fine Arts 339 or Fine Arts 340 (3 units).

Fourth Year:

At least 18 units in courses in the Faculty of Arts numbered 300 and above, including Fine Arts 480 (3 units) and 9 units chosen from Fine Arts 481-485.

Requirements for the Diploma in Art History:

Students shall already have a first degree in another discipline. Applications for admission should be made to the Registrar preferably before 1 August for entry in September.

The Diploma program requires 15 units of courses in art history at the 300 level or above. (No more than 3 units of cross-listed courses offered by other departments, excepting Fine Arts 329, may be counted toward the requirements.) Fine Arts 373 and 375 are required for all students unless written permission to the contrary is given by the Department. Only 3 units of Pass standing may be credited towards the Diploma requirements.

FRENCH

The Department of French offers programs of study that lead to the degrees of Ph.D., M.A., B.A. and to a Diploma in Translation.

Requirements for the degree of Bachelor of Arts:

Students wishing to specialize in French will normally choose to concentrate either in literature or in language. Both programs include combinations of general and specialized courses. *Other combinations may be approved after discussion of individual needs and interests with departmental advisers.*

Major Program in French with emphasis on Language:

First and Second Years:

French 120 (or equivalent), 202, 220 (French 220 may be taken in Third Year, with permission of the Department).

Third and Fourth Years:

French 302, 402, and

— 6 units from French 306, 308, 316, 404, 405, 422, and

— 3 units in literature courses numbered 301, 407-421.

Major Program in French with emphasis on Literature:

First and Second Years:

French 120 (or equivalent), 202, 220 (French 202 and 220 may be taken in the Third Year with permission of the Department).

Third and Fourth Years:

French 302, and

— 12 units in courses numbered above 300 (excluding 303, 305, 320, 400, 403), of which 9 units must be from literature courses 301, 407-421.

Honours Program in French with emphasis on Language:

First and Second Years:

French 120 (or equivalent), 202, 220.

Third and Fourth Years:

French 302, 402, 449, and

— 12 units, of which at least 9 must be from 306, 308, 316, 404, 405, 422, and

— 3 units in literature courses numbered 301, 407-421 (French 301 highly recommended).

Honours Program in French with emphasis on Literature:

First and Second Years:

French 120 (or equivalent), 202, 220.

Third and Fourth Years:

French 301, 302, 401, 402, 449, and

— 9 units, of which at least 6 must be from literature courses 407-421.

Notes:

French 202 or its equivalent is prerequisite to all French language courses numbered 300 and above (except 303, 305, 320, 323); French 220 or its equivalent is prerequisite to all French literature courses numbered 401 and above.

Apart from those courses given in a fixed sequence (301-401, 302-402-404), courses, whether numbered in the 300's or 400's, may be taken in either the Third or the Fourth Year.

Diploma in Translation

Prerequisites: Bachelor's degree or equivalent, or, in the case of mature applicants with considerable professional experience, extensive work in the field of translation. All candidates for admission must demonstrate a high level of proficiency in written and spoken English and French. Selection will be made on the basis of a written test (including précis-writing and translations).

Course of Study: The program consists of fifteen units of work, which may be completed in one year of full-time study.

French 423 (3) *Advanced Translation: French to English.*
French 424 (3) *Advanced Translation: English to French.*

NOTE: French 423 and French 424 are to be taken concurrently.

French 426 (3) *Comparative French and English Stylistics.*
French 427 (3) *Seminar in Advanced Translation.*
French 429 (3) *Translation Project.*

NOTE: With the approval of the program adviser, three units of the above offerings may be replaced by one of the following courses: Linguistics 425, Creative Writing 415 or 495.

GEOGRAPHY

The Department of Geography offers programs of study that lead to the degrees of Ph.D., M.A., B.A., M.Sc., B.Sc. See **Faculty of Science** for B.Sc.

In March, the Department circulates its own booklet, **A Guide to Geography**, which gives detailed information about the programs offered by the Department. It also produces **Geography 3rd and 4th Year Course Guide** and **Geography Graduate Courses.** Interested students should write to the Department for copies.

Requirements for the degree of Bachelor of Arts:

Major

First and Second Years:

Geography 220 and 260; and at least 3 units from Geography 101, 202, and 205.

Note the following points:

(a) Geography 110 and 190 are not required but are strongly recommended.
(b) Students who take 6 units of 100 or 200-level Geography in their first year may take up to 3 units of 300-level Geography technique courses in their

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second year. These units will count towards the departmental requirement of 3 units of technique courses for the Major.

(c) Students intending to major in Geography with an emphasis on environmental studies must take Geography 101, 202, 205 and 3 units of Mathematics. Students intending to emphasize economic or urban geography are normally required to take 3 units of Mathematics.

Third and Fourth Years:
15 units of Geography courses numbered 300 or above, and selected as follows:
4½ units from Geography 310, 320, 350
3 units from Technique Courses (see list below)
1½ units from Regional Courses (see list below)
6 other units, of which at least 3 shall be at the 400 level.
Note the following points:

(a) Students may wish to select their optional courses from one of the following streams: Cultural/Historical, Economic, Environmental, Urban. Courses in these streams are listed below.

(b) The Department of Geography has a special commitment to promote understanding of the cultures and economies of Pacific Rim states, and of Canada's relations with China, Japan, and the nations of South and Southeast Asia. Courses may be selected to emphasize the geography of Pacific Rim countries. See the list below.

Honours
First and Second Years:
As for Major.

Third and Fourth Years:
21 units of Geography courses numbered 300 or above, and selected as follows:
4½ units from Geography 310, 320, 350
3 units from Technique Courses (see list below)
1½ units from Regional Courses (see list below)
Geography 345, 445, and 449.
6 other units, of which at least 3 shall be at the 400 level.
See notes (a) and (b) under **Major: Third and Fourth Years.**

The Honours Program in Geography differs from the Majors Program in two respects; (a) degree of specialization, and (b) standing, which must be at least second class. Students who are interested in the Honours Program should consult the Department before the end of their second year, or during the pre-registration or registration periods at the beginning of their third year.

Individual Honours Programs require the approval of the Departmental Undergraduate Program Committee.

Undergraduate Courses

Students who have a special interest in any course but do not have the prerequisites should consult the departmental advisers.

Introductory Courses: 101, 110, 190, 220, 260, 431.
Major and Honours Seminars and Honours Essay: 345, 407, 445, 448, 449
Technique Courses: 309, 370, 371, 372, 374, 375, 470. These courses are primarily intended for Third-Year students.
Regional Courses: 385, 386, 390, 394, 395, 481, 483, 484, 491, 493, 494, 495, 497, 499.
Cultural/Historical Courses: 320, 324, 327, 328, 329, 423, 424, 425, 427.
Courses on Economic Geography: 352, 360, 361, 362, 363, 410, 461, 464, 467, 468.
Environmental Courses: 310, 315, 317, 410, 415, 417, 418, 423, 424.
Urban Courses: 350, 351, 352, 357, 450, 453, 457, 464.
Pacific Rim Courses: 320, 385, 386, 395, 425, 468, 481, 483, 484, 491, 494, 495, 499.
Graduate Courses and Seminars: *First Year*—500, 506, 510, 515, 520, 521, 522, 525, 526, 530, 531, 532, 533, 534, 540, 541, 543, 544, 547, 548.
Second Year and above—560, 561, 570, 571, 573, 575, 600.
Readings and Theses—550, 555, 599, 699.

Notes: The following courses have *Science credit:* Geography 101, 202, 205, 301, 302, 303, 306, 308, 309, 330, 401, 402, 403, 405, 406, 407, 409, 449, 500, 520, 521, 522, 525, 526, 555, 560, 561.

Several courses in Geography involve field expenses. Students should check with advisers during registration.

GERMANIC STUDIES

The Department of Germanic Studies offers programs of study that lead to the degrees of Ph.D., M.A., and B.A.

Requirements for the degree of Bachelor of Arts:
Major in German
First and Second Years:
Sequence I: (for students with no prior knowledge of German): German 100; 200.
Sequence II: (for students with high-school German or German-language background): German 110 or 120; 223 or 233.
Sequence III: (intensive): German 123,[1] 233/333 or 100, 200, 233.

Third and Fourth Years:
Sequence I: German 300,[2] 310, 350, 400,[3] 450, and 3 additional units of German courses 402-410.
Sequence II: German 310, 323 or 333, 350, 450, and 3 additional units of German courses 402-423.
Sequence III: German 310, 333, 350, 450, and 3 additional units of German courses 402-423.

Honours in German
Third and Fourth Years:
Sequence I: German 300,[2] 310, 350, 400,[3] 439, 450, and 3 additional units of German courses 402-410.
Sequence II: German 310, 323 or 333, 350, 439, 450, and 3 additional units of German courses 402-423.
Sequence III: German 310, 333, 350, 439, 450, and 3 additional units of German courses 402-423.

Notes: [1]German 123 is open only to students with no prior knowledge of German.
[2]Students who have taken 223 or 233 will not receive credit for 300. In Sequence I, German 300 is taken in addition to the requirements for the Major and Honours Program.
[3]Students who have taken 323 or 333 will not receive credit for 400.

History 407 or 408; an alternative may be taken only with the permission of the Departmental adviser.
One university-level course in a language other than English and German.
A graduating essay (3 units) may be offered instead of a senior course.

Courses are offered in German and in Germanic Studies, the latter including an elementary and an intermediate course in Swedish.

Courses numbered 400 and above are normally given in alternate years. The Department should be consulted as to whether courses with 1½ units of credit will be given in the first or second term.

GREEK—see Classics

HISPANIC AND ITALIAN STUDIES

The Department of Hispanic and Italian Studies offers programs of study that lead to the degrees of Ph.D., M.A. and B.A.

Requirements for the degree of Bachelor of Arts:
Italian
Major
First and Second Years:
Italian 100, 200 or 101, 201 or 105.

Third and Fourth Years:
15 units in Italian courses numbered above 300, excluding Italian Studies 330, 431 and 432. Italian Studies 330 is, however, recommended as an elective.

Honours
First and Second Years:
Italian 100, 200 or 101, 201 or 105.
Latin 100 or equivalent is strongly recommended.

Third and Fourth Years:
Italian 400, 449.
18 additional units in Italian courses numbered above 300, excluding Italian Studies 330, 431 and 432. Italian Studies 330 is, however, recommended as an elective.

Note: Students with Italian 11 or 12 should consult the Department for placement in appropriate language courses.

Spanish and Portuguese

Prerequisites: Students wishing to specialize in Spanish may choose to concentrate either on literature or on language. Both recommended programs provide combinations of survey courses and more specialized courses. Other combinations may be approved for individual students, who should discuss their needs and interests with the Department advisers. Students with a previous knowledge of Spanish should also consult the Department advisers.

First and Second Years:

	A	B*	C	D*
Spanish	100	105	110	100
	200	300	205	200, 205
	220	220	220	220

Spanish 220 may be taken in Third year with the permission of the Department.
Also recommended: Spanish 211, Portuguese 102, 202.

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*Students who have completed Sequence B above, or who have first class standing in Sequence D, proceed to Spanish 400.

Program in Spanish, Portuguese and Latin American Literatures

Major

Third and Fourth Years:

15 units minimum, including the following:

Spanish 300, except for students with Sequence B above, or first class standing in Sequence D, who take Spanish 400.

Two of the following survey courses: Spanish 335, 355, 363.

6 units to be chosen from courses numbered above 400 in consultation with Department advisers. At least 1½ units must be from a field not covered by the two surveys.

Honours

Third and Fourth Years:

24 units minimum, including the following:

Spanish 300, except for students with Sequence B above, or first class standing in Sequence D, who take 3 extra units from the recommended electives (see below). Spanish 400.

Two of the following survey courses: Spanish 335, 355, 363.

9 units to be chosen from courses numbered above 400 in consultation with Department advisers. At least 1½ units must be from a field not covered by the two surveys.

Spanish 449, Honours Essay.

A reading knowledge of Latin or another Romance language is strongly recommended.

Recommended electives: Spanish 400 (for Major only where applicable), 403, 407, 444, Portuguese 392.

Recommended electives in History: 350, 351, 450, 451, 489.

Program in Spanish with Emphasis on Language

Major

Third and Fourth Years:

15 units minimum, including the following:

Spanish 300*, 400, 403.

3 units of Spanish 407 or one of the following: Portuguese 307, Spanish 444 (Catalan), Italian 300, Romance Studies 420.

One of the following; Spanish 335, 355, 363.

*Students with Sequence B or first class standing in Sequence D omit Spanish 300 and take **both** Spanish 407 **and** and one of Portuguese 307, Spanish 444, Italian 300, Romance Studies 420.

Honours

Third and Fourth Years:

24 units minimum, including the following:

Spanish 300, 400, 403, and 3 units of 407. Students with Sequence B or first class standing in Sequence D omit Spanish 300.

One of the following: Portuguese 307, Spanish 444 (Catalan), Italian 300, Romance Studies 420. Students with Sequence B or first class standing in Sequence D must select two of these courses.

6 units of literature, including at least three units selected from the following: Spanish 335, 355, 363.

Spanish 449, Honours Essay.

Students are expected to have a reading knowledge of French.

Recommended electives (to be chosen in consultation with Department advisers): Spanish 349; Linguistics 319, 320, 420, 425, 435; English 320; Latin 100.

Romance Studies and Languages

Program in Romance Studies

Honours

First and Second Years:

First- or high second-class standing in the courses taken in Romance Languages.

Latin 100 or equivalent is strongly recommended.

Third and Fourth Years:

24 units numbered 300 and above in at least two Romance languages, including a graduating essay.

Program in Romance Languages

Honours

The purpose of this program is to enable students to attain a high level of proficiency in two of the major Romance languages (French, Italian, Spanish), and a reading knowledge of a third, together with some linguistic and literary background.

First and Second Years

First or high second class standing in the prerequisite courses for two of the following languages:

French (French 120 or equivalent, 202 and 220)

Spanish (Spanish 100, 200 or equivalent: see Sequences A, B, C, D above)

Italian (Italian 100, 200 or 101, 201 or 105)

Linguistics 100 or 200 (Those interested in further linguistics studies take 200, others take 100.)

Recommended: Latin 100

Third and Fourth Years

12 units from 2 languages: French 302, 402; Italian 302, 400; Spanish 300, 400.

3 units of a third Romance language: French 320, Italian 300, Spanish 305, Catalan (Span. 444), Portuguese 307, Rumanian (Romance Studies 420). 3 units of Romance Linguistics (Romance studies 420 or Linguistics 320).

6 units of literature, three from each major language studied. Students of Italian and Spanish are required to take a survey course in consultation with a Departmental adviser.

3-6 units chosen from the following: Linguistics 319 (Prerequisite Linguistics 200), Latin 305; French 306, 308, 334, 335, 404, 407-420; Italian 305, 306, 401-404, 415; Italian Studies 310; Spanish 335, 355, 363, 392, 403-438, 457-468.

HISTORY

The Department of History offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Requirements for the degree of Bachelor of Arts:

Major

First and Second Years:

6 units from any of the 100 or 200-level courses in History (which may include Medieval Studies 200), or the equivalent taken in other institutions.

Students who intend to major in history are advised to include in their program some of the basic courses in the social sciences and the appropriate historical surveys of literature in the various departments of language, of thought in the departments of Philosophy, Religious Studies, and Political Science, and of the arts in the departments of Fine Arts, Music, and Theatre.

Third and Fourth Years:

15 units of third- and fourth-year history courses chosen in consultation with a departmental adviser.

The following courses outside the Department may be counted toward the Major:

One of:

Classical studies 331, 332, 333, 433, 435

One of:

Asian Studies 405, 420, 423

Economics 334, 336

Geography 327 and 328, 427

History of Medicine 400 and 401

A History Major may, in order to build a suitable program, obtain special permission from the Department to count a course other than one of those listed above.

Honours

First and Second Years:

First- or Second-class standing in 6 units from any of the 100 or 200 level courses in History (which may include Medieval Studies 200) or the equivalent taken in other institutions.

Reading knowledge of French or a foreign language

Third Year:

History 321, 322 and 333

3 units outside the Department

Fourth Year:

History 421, 433 and 449

3 units outside the Department

An oral examination on the graduating essay.

Honours in History with International Relations

First and Second Years:

First- or Second-class standing in 6 units from any of the 100 or 200 level courses in History chosen in consultation with an adviser in the International Relations Program.

Political Science 204

Prerequisites for courses to be taken in the upper years.

Reading knowledge of French or a foreign language.

Third Year:

History 321 and 333. 3 units in History. In consultation with History Department International Relations adviser, 6 units selected from courses listed in International Relations Majors Program under the headings Asian Relations, Economics, General International Politics and Soviet and Eastern Europe.

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Fourth Year:
History 421 and 449. One of History 430, 432. 3 units elective. An oral examination on the graduating essay.

Undergraduate Courses in History.
Medieval, Renaissance and Reformation History: 101, 207, 208, 313, 370, 371, 372, 373, 374, 375, 413, 470. See also Medieval Studies.
Modern European History: 115, 120, 122, 202, 306, 315, 316, 319, 324, 325, 331, 334, 351, 400, 405, 406, 407, 408, 415, 425, 431, 432, 435, 438, 440, 441, 451.
Modern British History: 203, 318, 418, 419, 460. See also History 373.
History of Colonial Expansion Overseas: 201, 305, 310, 314.
Canadian History: 135, 205, 302, 303, 307, 326, 329, 401, 404, 420, 426, 430, 437, 439. For supporting courses, see also Canadian Studies.
American History: 237, 327, 328, 338, 428, 429, 436, 442, 443, 444, 445, 446, 447.
Asian History: 170, 171, 270, 271, 273, 309, 380, 381, 382, 383, 384, 385, 387, 388, 422, 423, 434, 480, 482.
Latin American History: 350, 450, 489.
International Studies: 125, 402, 403, 448.
Honours Courses (For Honours students only): 321, 322, 333, 421, 433, 449.
Many of the courses classified as national or regional emphasize social themes.
Brochures are available from the departmental office, describing in detail the courses offered each year in History 100-299, 300-499.

Special Programs in History

Medieval History
A Major Program is available for students who wish to concentrate in the history of Medieval Europe. The program consists of 12 units of Medieval history, including History 370 in the Third Year, History 470 in the Fourth Year and two courses chosen from: History 370, 371, 372, 373, 374, 375. History 313 (The Renaissance) may be substituted for one of these two courses.

Economic History
Students may also elect a Major Program in History (Economic History) offered jointly by the Departments of History and Economics. For a description of this program see **ECONOMIC HISTORY** (above).

INTERNATIONAL RELATIONS

Students who want to do graduate work in International Relations are advised to enrol in the special Honours programs in History (International Relations) or in Political Science (International Relations).

Requirements for the degree of Bachelor of Arts:
Major
First and Second Years:
Students must take two of the following three courses, and it is recommended that they take all three. They can make up a prerequisite in their third year.
Economics 100.
History 125.
Political Science 260.
Other relevant (but not required) courses:
Anthropology 202.
Asian Studies 105, 115, 206.
Geography 220, 260 (1½ units each).
Political Science 200, 220, 240, 280 (1½ units each)
Slavonic Studies 105.
Students who plan to concentrate in the Economics group in the Third and Fourth Years must take Economics 100 in First or Second Year. *Either* Economics 301 and 302 *or* Economics 306 and 307 are prerequisite for 400-level courses in Economics.
Students planning to take courses in Anthropology should consult their adviser in connection with prerequisites and the suitability of course content. A reading knowledge of a second language is recommended.

Third and Fourth Years:
16½ units including:
One of: History 402 (1½), History 403 (1½), Political Science 464 (1½), Anthropology 495 (1½-3), Asian Studies 438 (1½), Psychology 417 (1½-3), Slavonic Studies 448 (1½) or another course designated by the International Relations Program Coordinating Committee. (Open to Fourth-Year students only. Students must obtain approval of an International Relations Program Adviser before enrolling in any of these courses).
3 units from: History 430, 432
3 units from: Political Science 360, 361, 362 (1½), 363 (1½/3), 364, 365 (1½/3) and 366 (1½).
9 units from one or two of the following groups:

Asian Relations
Anthropology 302-3 (with permission of Department and Program adviser).
Anthropology 402-5 (with permission of Department and Program adviser).
Anthropology 430 (Prerequisite: Anthropology 200 and permission of the Department)
Asian Studies 405
Asian Studies 420
Asian Studies 438 (1½)
Asian Studies 450
Economics 341 (1½)
Economics 342 (1½)
Geography 385 (1½)
Geography 386 (1½)
Geography 390 (1½)
Geography 481 (1½)
Geography 483 (1½)
Geography 484 (1½)
History 309
History 380
History 385
History 422
History 423
History 434
Political Science 321
Political Science 322
Political Science 323
Political Science 324
Political Science 327 (1½/3)
Political Science 365 (1½)
Political Science 421 (1½/3)
Sociology 460

Economics
Anthropology 330 (with permission of Department and Program adviser.)
Anthropology 414 (1½-3) (with permission of Department and Program adviser).
Anthropology 430 (Prerequisite: Anthropology 200 and permission of the Department)
Economics 334
Economics 341 (1½)
Economics 342 (1½)
Economics 355 (1½) or both 455 (1½) and 456 (1½)
Economics 440
Economics 487
Political Science 366 (1½)

General International Politics
Anthropology 430 (Prerequisite: Anthropology 200 and permission of the Department)
Geography 329 (1½)
Geography 395 (1½)
Geography 468
Geography 495 (1½)
History 310
History 334
History 350
History 403 (1½)
History 407
History 425
History 430
History 432
History 436
History 437
History 441 (1½)
History 448 (1½)
History 450 (1½/3)
History 489 (1½)
Political Science 360
Political Science 361
Political Science 362 (1½)
Political Science 363 (1½/3)
Political Science 364
Political Science 366 (1½)
Political Science 460 (1½/3)
Political Science 461 (1½)
Political Science 462 (1½)
Political Science 463 (1½)
Political Science 465 (1½)
Psychology 308

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Sociology 301 (with consent of Department and Program adviser).
Sociology 330
Sociology 460 (with consent of Department and Program adviser).
Sociology 461 (Prerequisite: a Second-Year Sociology course)
Sociology 462

Soviet and Eastern Europe

Economics 487
Geography 394 (1½)
Geography 494 (1½)
History 405
History 435
History 438
Political Science 325 (1½)
Political Science 460 (1½/3)
Slavonic Studies 340
Slavonic Studies 447 (1½) (with permission of Department and Program adviser)
Slavonic Studies 448 (1½) (with permission of Department and Program adviser).

Advisers for the Program in International Relations are Professors Barman, Kubicek and Egerton (History), Holsti, Marantz, Wallace, and Zacher (Political Science), Goldman (Asian Studies), Glassman (Economics), Knox (Psychology), North (Geography), and Johnson (Anthropology and Sociology).

ITALIAN—see Hispanic and Italian Studies.

JAPANESE—see Asian Studies.

LATIN—see Classics.

LINGUISTICS

The Department of Linguistics offers programs of study that lead to the degrees of Ph.D., M.A. and B.A., and to the Diploma in Applied Linguistics.

Requirements for the degree of Bachelor of Arts:

Major in Linguistics

First and Second Years:
6 units of a language other than English, at University level, or equivalent.
First Year:
Linguistics 100 is recommended
Second Year:
Linguistics 200
Third and Fourth Years:
Linguistics 300, 301, 319, 400, 401
At least six additional units from senior courses in Linguistics, or in cognate fields with special permission.

Honours in Linguistics

Prerequisite courses as for the Major in the first and second years.

Admission to Third Year:
At least high second-class average in the first and second years.
First-class standing in Linguistics 200

Third and Fourth Years:
Linguistics 300, 301, 319, 400, 401
At least twelve additional units from senior courses in Linguistics, or in cognate fields with special permission.

The following courses may be accepted for credit in Linguistics, subject to the approval of the Department:
Anthropology 417: Language and Culture
Anthropology 512: Language and Culture.
Chinese 503: Problems in the History of the Chinese Language.
Computer Science 503: Computational Linguistics No. I.
Computer Science 523: Computational Linguistics No. II.
Education 478: Teaching English as a Second Language.
Education 489: Applied Linguistics for Teachers.
English 320: History of the English Language.
English 322: Stylistic Variation.
English 323: Dialectal Variation.
English 324: Literary Semantics.
English 326: Studies in the English Language.
English 329: The Structure of Modern English.
English 507: Studies in the History of the English Language.
English 508: Studies in the Structure of the English Language.
French 308: Introduction to the History of the French Language.
French 405: Modern French: A Linguistic View
French 515: Studies in Romance Philology.
French 516: Studies in the History of the French Language.
German 502: History of the German Language.
German 510: Old Icelandic.
Italian 415: History of the Italian Language.
Japanese 523: Topics in the History and Structure of the Japanese Language.
Philosophy 450: Philosophy of Language: A.
Philosophy 451: Philosophy of Language: B.
Psychology 521: Psycholinguistics.
Russian 303: Introduction to Russian Linguistics.
Russian 502: Comparative Slavic Linguistics.
Russian 509: Old Church Slavonic.
Russian 510: History of the Russian Language.
Russian 515: Russian Linguistics: Phonemics.
Russian 516: Russian Linguistics: Morphophonemics.
Russian 517: Russian Linguistics: Syntax.
Russian 518: Russian Linguistics: Lexicology.
Spanish 403: History of the Spanish Language.
Spanish 501-2: Studies in Hispanic Languages.

Major in Speech Sciences

First and Second Years:
Mathematics 100 or 111, and 101
Physics 110 or 115
Biology 101 or 102

First Year:
Linguistics 100 is recommended

Second Year:
Linguistics 200
Psychology 200

Third and Fourth Years:
Linguistics 300, 310, 315, 350, 400
Linguistics 301 or Linguistics 401
At least three additional units selected from:
Psychology 301, 304, and 313.

Note: Students majoring in Speech Sciences should be aware that Linguistics 301, 319 and 401 are necessary for graduate studies in Linguistics.

Honours in Speech Sciences

First and Second Years:
As for the Major.

Admission to Third Year:
At least a high second-class in the first and second years. First-class standing in Linguistics 200.

Third and Fourth Years:
Linguistics 300, 310, 315, 350, 400
Lingustics 301 or 401
Three additional units in Linguistics courses numbered 300 and above.
Six units chosen from Psychology 301, 304, and 313.

Requirements for the Diploma in Applied Linguistics

1. Applicants must have completed a Bachelor's degree in Arts or Education. They must have at least a major or its equivalent in the language with which they are concerned. It should be noted that this program is not designed to provide practical training in any particular language skills.
2. The program may be completed in one year of full-time study, but could also be taken part-time. It should be finished within a period of 5 years.
3. A variety of programs may be arranged; for example:
   (a) with illustrative material drawn from one or more of the languages covered by Education 404 — the methods course for language teachers. If Education 404 does not cover the language required by the student, special arrangements may be made under the heading of Education 449 (Supervised Study).
   (b) with emphasis on English as a second language.
   (c) with emphasis on phonetics.
4. The prerequisites are:
   Linguistics 420 (or equivalent) for all students.
   In addition, for those who wish to be language teachers in the B.C. school system: an Education degree or completion of the One Year Program for Graduates (either Elementary or Secondary) which contains Education 304 or 404 or equivalent (with concentration on one or more of the languages covered in these courses).
5. Fifteen (15) additional units of course work will be required to complete the program, at least nine (9) of which must be in Linguistics.
6. Six units from the following courses in Linguistics will be compulsory for all candidates (unless they have equivalent courses as part of their first degree):
   At least 3 units chosen from:
   Linguistics 300/301
   Linguistics 400/401

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and
At least 3 units chosen from:
Linguistics 319
Linguistics 435
Linguistics 445

7. With the assistance of the Linguistics Department's Diploma Adviser and the advisers from other departments or faculties concerned, courses worth a total of 9 units (including at least 3 units in Linguistics) are to be chosen from the list of senior courses in Linguistics and a list of suitable courses in other departments which can be obtained from the Linguistics Department Office.

MATHEMATICS

The Department of Mathematics offers programs of study that lead to the degrees of Ph.D., M.A., B.A. For information about the degree of Bachelor of Science offered by the Department of Mathematics, see **MATHEMATICS** under **Faculty of Science.**

Bachelor of Arts programs combining Mathematics with another subject such as Economics, English, Linguistics, Music, Philosophy, etc., are encouraged. Students should consult an adviser as early as possible. This is particularly important for those anticipating a career in teaching.

A special brochure describing programs and opportunities in Mathematics is available in the departmental office.

Requirements for the degree of Bachelor of Arts:

Major

The student may develop a program of study within the framework of any one of three Major options, each of which has a particular emphasis (General, Mathematical Statistics, Optimization). Students preparing for a career in elementary or secondary school teaching are advised to select the General Mathematics option, either as a Major in Math or as part of a double Major in Math and another subject. In the double Major, up to 3 units of specified Mathematics related courses may be replaced by other more appropriate Mathematics related courses with the permission of the Department.

First and Second Years:
Mathematics 100 and 101 (or 120 and 121)[1]
Mathematics 200 and 201 (or 225)[1]
Mathematics 221[2]
Mathematics 200, 315[3]

It is recommended that students take Computer Science 114/116 (or 118) in First or Second Year.

Third and Fourth Years:

15 units of Mathematics or Mathematics related courses which satisfy the requirements of one of the three program options listed below:

Option I: General Mathematics
Mathematics 307, 310, 311, 302, 340
4½ units of other Mathematics, Statistics, or Computer Science courses numbered 300 or above. Students may substitute courses chosen from Mathematics 300, 320, 321, 322, 323 for any of the required courses under this option.

Option II: Mathematical Statistics
Mathematics 307
Mathematics 314 (or 320)
Mathematics 302[3] and 303 (or 418)
Statistics 305 and 306
Statistics 404 and 405
3 units of additional Mathematics courses numbered 300 or above

Option III: Optimization/Operations Research
Mathematics 307
Mathematics 314 or 320
Mathematics 302 and 303 (or 418)
Mathematics 340 and either 341 or 342
6 additional units of Mathematics, Statistics, or Computer Science courses numbered 300 or above[4]
Outside electives must include 6 units in an area of application[5]

Notes: 1 Qualified students are advised to choose the sequence 120, 121, 222 (see note 2) and 225 in the first two years, as they may find the greater emphasis on concepts more appropriate to their interests.

2 Mathematics 222 may be taken in place of the combination of 221 and 307.

3 Major students may choose to take Mathematics 201, 220, or 315 in the third year. Students in Mathematical Statistics are advised to take Mathematics 302 in the second year, and to take Mathematics 315 in the third year.

4 Statistics 305 and 306, and Computer Science 405 and 406 are recommended.

5 Economics is the most likely area of application for students in the Faculty of Arts. The appropriate Economics courses are 420, 471, and 472. However the student may select another area of application and take 6 units of courses number 300 or above in that area with the permission of the Mathematics Department.

Honours

First and Second Years
Mathematics 120 and 121 (or 100 and 101)
Mathematics 222
Mathematics 225 (or 200 and 201)
Mathematics 220[1]
Computer Science 114/116 (or 118), Physics 120 (or 115 or 110), and Physics 200 or 206 are recommended.

Third and Fourth Years
Mathematics 320, 321 (or 300), 322, 323[2]
At least 9 units chosen from Mathematics 400, 418, 422-426.

Students intending to enter the Honours Program should consult a Mathematics Honours Adviser in the second year. To be admitted to the Honours Program a student must obtain at least second class standing in Mathematics 121, or first class standing in Mathematics 101. To continue in the Honours Program a student must obtain at least second class standing in each required Mathematics course, and maintain at least an overall second class average. Students who intend to do graduate work in Mathematics should continue their study of French, German, or Russian beyond the level which fulfills the language requirement of the Faculty of Arts.

Special Honours Programs in Mathematics and Another Subject

First and Second Years:
Mathematics: As in Honours Mathematics
Other subject: As specified by the other department

Third and Fourth Years:
Mathematics 320
6 units chosen from Mathematics 321 (or 300), 322, 323
At least 6 units chosen from: Mathematics 400, 418, 420, 422-426.
Other subject: As specified by the other department.

Notes: 1 Students who obtain first class standing in Mathematics 120 and 121 and at least second class standing in the first term of Mathematics 222 and 225 may be exempted from Mathematics 220.

2 Another Mathematics course more suitable for the particular program of the student may be substituted for Mathematics 323 with the permission of the department.

MEDIEVAL STUDIES

Students intending to concentrate in Medieval Studies may do so either by completing a Major program in a particular department of the Faculty of Arts, with outside electives taken from the courses listed below, or by taking an interdisciplinary Major program in Medieval Studies. (For permission to arrange this program consult the Medieval Studies Adviser.) The prerequisite for the interdisciplinary program is three units selected from: History 101, Medieval Studies 200, Classical Studies 100. Other first and second-year courses applicable to this program are: Classical Studies 210/Philosophy 210, History 205, History 207, History 208, Music 120, and Religious Studies 202. Students should also develop the appropriate language skills as soon as possible.

For further guidance on the Major program and individual course offerings, the Committee for Medieval Studies prepares an annual brochure, which is available in the offices of the Departments of Classics, Hispanic and Italian Studies, English and History. Students should consult with the departments offering these courses and plan their third and fourth years at the same time, as not every course is offered every year.

The following are courses in medieval studies offered in the Faculty of Arts:

Asian Studies 340 (3) History of Indian Civilization to 1526.
Classical Studies 331 (3) Ancient History.
Classical Studies 333 (3) The Roman Empire. Prerequisite: Classical Studies 331 or permission.
Classical Studies 436 (3) Classical Thought. Prerequisite: a course in Classical Studies or Philosophy or permission.
English 311 (3) Literature of the Bible.
English 320 (3) History of the English Language.
English 340 (1½) Introduction to Old English.
English 341 (1½) Old English Poetry. Prerequisite: English 340.
English 350 (3) A Survey of Middle-English Literature excluding Chaucer.
English 351 (1½/3) Studies in Middle English Literature.
English 352 (1½) Middle English.
English 353 (1½) Early English Drama.
English 355 (1½/3) Chaucer.
Fine Arts 331 (3) Early Medieval Art. (Same as Religious Studies 326)

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Fine Arts 333 (3) Architecture of the High Middle Ages. (Same as Religious Studies 327)
Fine Arts 335 (3) Art of the Italian Renaissance from Giotto to Michelangelo.
Fine Arts 431 (3) Seminar in Early Medieval Art.
Fine Arts 433 (3) Seminar in Medieval Art.
Fine Arts 435 (3) Seminar in Fifteenth- and Sixteenth- Century Art.
French 308 (3) Introduction to the History of the French Language. Prerequisite: one year of Latin.
French 407 (3) Medieval French Literature.
Germanic Studies 510 (1½/3) Old Icelandic. Open to advanced undergraduates with the permission of the instructor.
History 313 (3) The Renaissance.
History 370 (3) Social History of Medieval Europe.
History 371 (3) Economic History of Europe to 1750.
History 372 (3) Ideas and Institutions of the Middle Ages.
History 373 (3) Medieval English Institutions.
History 374 (3) Medieval France.
History 387 (1½) Medieval India.
History 470 (3) Seminar in Medieval History. For major students in History or Medieval Studies.
Italian 401 (3) Italian Literature of the Middle Ages. Prerequisite: knowledge of Italian.
Italian 402 (1½/3) Topics in the Literature of the Italian Renaissance.
Italian Studies 310 (3) The Divine Comedy in Translation.
Italian Studies 431 (3) Literature of the Italian Renaissance in Translation.
Latin 305 (3) Medieval Latin. Prerequisite: Latin 100.
Linguistics 320 (1½-3) Romance Linguistics.
Medieval Studies 440 (3) Seminar in Medieval Studies.
Medieval Studies 449 (3) Graduating Essay or Supervised Study.
Music 327 (1½/3) Liturgical Music I. Prerequisite: Music 121.
Music 350 (1½/3) Early Christian and Medieval Music. Prerequisite: Music 121.
Music 352 (1½) Late Medieval and Early Renaissance Music. Prerequisite: Music 121.
Philosophy 373 (1½) Medieval Philosophy—A.
Philosophy 383 (1½) Medieval Philosophy—B.
Religious Studies 340 (3)d The Heritage of Islam.
Religious Studies 341 (3) Islamic Art and Archaeology. (Same as Fine Arts 359.)
Religious Studies 408 (1½) Topics in Medieval Judaism.
Religious Studies 449 (1½) Seminar in the History of Muslim-Christian Relations.
Spanish 335 (3) Spanish Literature from its Origin to 1700. Prerequisite: knowledge of Spanish.
Spanish 403 (3) History of the Spanish Language. Prerequisite: knowledge of Spanish.
Spanish 407 (1½) Peninsular and Latin American Linguistic Areas.
Spanish 427 (1½) Selected Topics on Medieval Literature. Prerequisite: knowledge of Spanish.

MUSEUM STUDIES

The University Museum of Anthropology offers training in museum principles and methods for both undergraduate and graduate students. Theory is combined with practical experience provided in laboratories, workshops, and in the ongoing research and public programs of the Museum. The core of the training program is Anthropology 431, Museum Principles and Methods, offered in the Museum by the Department of Anthropology and Sociology. It is recommended that students take additional course-work in museum-related subjects offered by this department or by other departments such as Asian Studies, Classics, Fine Arts, History, and Archival Studies. See especially Anthropology 331, Anthropology of Art; Anthropology 341, Material Culture; Anthropology 451, Conservation of Organic Materials; Anthropology 452, Conservation of Inorganic Materials. Additional opportunities for tutorials, workshops, and job training are offered to advanced students by special arrangement.

Students intending to obtain a B.A., M.A., or Ph.D degree with Museum Studies as a component or focus should apply to the appropriate department for admission to a discipline such as Anthropology, Asian Studies, Classics, Fine Arts, or History, and also notify the Museum of their plans. People already working in the museum community or who wish to upgrade their knowledge and skills without entering a formal degree-program or becoming full-time students are invited to consider Anthropology 431 or a graduate seminar in Anthropology and Museum Studies. Admission is subject to the permission of the instructor and to the University regulations for admission as an unclassified student or auditor.

UBC MUSEUM OF ANTHROPOLOGY AWARDS AND FINANCIAL ASSISTANCE

The Lois McConkey Memorial Fellowship for Native Indian Work-Study Program

To honour the memory of Lois McConkey, author, educator, and founding member of the Volunteer Associates at the UBC Museum of Anthropology, and to pay tribute to her many contributions to educational work, her family, colleagues, and friends have established a fellowship for high school and university students of North American Indian descent. The award, approximately $800, may be made annually to a student of Indian descent who would benefit from an established work-study program at the Museum of Anthropology. The fellowship would contribute to the salary of the student working at the Museum in a supervised program, and may be supplemented by other funds if available. Enrolment in university courses will not be required of the candidate who has not yet completed high school. The award will be made on the recommendation of the Director of the Museum of Anthropology and the President of the Museum's Volunteer Associates. If in any one year a suitable candidate is not found the fellowship may not be awarded.

MUSIC

The Department of Music offers programs of study that lead to the degrees of Ph.D., D.M.A., M.Mus., M.A., B.Mus., B.A.

Requirements for the degree of Bachelor of Music:

Admission:

The entering class may be limited for First-Year music studies, and likewise for adequately qualified Second- and Third-Year transfers. Therefore, it is essential for each prospective applicant to write a letter as soon as possible to the Admissions Secretary, Department of Music, indicating interest in being considered for admission. As soon as possible after February 1 the student should write for detailed information regarding pre-admission procedures and examination dates. The letter should include name, address, telephone numbers, auditioning instrument(s), names of principal music teachers and years of study, other musical background, and proposed major field (see following pages). Applicants for First Year should also request one or more letters of recommendation to be sent to the Public Relations and Undergraduate Admissions Coordinator, The University of British Columbia, Department of Music, 6361 Memorial Road, Vancouver, B.C., V6T 1W5. At least one of these should be from a school music teacher. Applicants for transfer from other universities or regional colleges should request a letter of recommendation from the department head or senior counsellor of that institution. All letters should be sent directly by the referee and under no circumstances should pass through the hands of the applicant.

All applicants for admission to the University to major in music in the Bachelor of Music programs must meet the pre-admission requirements of the Department of Music, which generally include an interview, an entrance examination in music theory and aptitude, and a performing audition, as well as the academic requirements for admission to the University. The Departmental examinations and auditions must be taken at the scheduled times in the Spring. Acceptance for admission is based on the total evaluation of the skills and preparation of each applicant. Only those students who fulfil both the University and Departmental requirements for admission and meet the University deadline for submitting formal applications for admission will be considered for admission to the Winter Session as Bachelor of Music majors.

Requirements for the degree of Bachelor of Arts:

Major

First Year:
Music 100, 101; 120, 121
Second Year:
Music 200, 201; 220, 221
Third and Fourth Years:
Music 300, 301, and twelve additional units of 300- or 400-level music courses acceptable for credit in the Faculty of Arts.

Honours

First and Second Years:
As for major
Third and Fourth Years:
Music 300, 301, 352, 353, 449, and nine additional units of 300- or 400-level music courses acceptable for credit in the Faculty of Arts and chosen after consultation with the Department

Performing Organizations

All students in the Bachelor of Music programs participate in the large and small instrumental and choral ensembles sponsored by the Department of Music to develop their skill as musicians and to experience a wide range of repertoire. The organizations include qualified non-music majors as well, who may be accepted by audition and who may receive credit for participating (consult Faculty listings). The major ensembles are the University Chamber Singers, University Singers, University Choral Union, University Symphony Orchestra, University Wind Symphony, University Opera Workshop and Theatre, the Contemporary Players, the Asian Music Ensemble, the Stage Band, and the Department of Music Collegium Musicum Ensembles. No more than half of a student's small-ensemble credit is to be in Stage Band. Where the term "large ensemble" is used in lists of degree require-

ments, it refers to Music 150 (University Symphony Orchestra), 152 (University Wind Symphony), 153 (University Singers), and 154 (University Choral Union).

Recitals by Faculty and Students

Faculty Recitals: Members of the Faculty present formal recitals throughout the academic year, open to the public without charge. All students in the program are expected to attend.

Wednesday Noon-Hour Recitals: On many Wednesdays, recitals feature outstanding soloists and chamber ensembles. Students in the program are expected to attend.

Student Repertory Series: Informal recitals are held each week throughout the academic year on Tuesday afternoons at 12:30 in the Recital Hall of the Music Building. All students in the program are expected to attend and to participate as their instructors recommend.

Student Recital Series: More formal recitals are presented occasionally during the academic year. Normally several students will share one of these periods upon the recommendation of the faculty. Attendance is expected of students majoring in performance.

Graduation Recitals: All students of composition and performance (except opera) must present full-length graduation recitals in partial fulfilment of their requirements. All students in the program are expected to attend.

Minimum Achievements in Piano

Where piano is neither the *major nor concentration* instrument, the student will be expected to demonstrate the following achievement levels at the ends of the first and second years:

End of first year.

—Independently-prepared repertoire at the approximate difficulty of Toronto or Western Board Grade IV.

—Sight-reading at the approximate difficulty of Toronto or Western Board Grade III.

—Transposition of pieces at the above sight-reading level to most other keys.

—Improvisation of accompaniments using common-practice harmonies and or contemporary techniques (melody and accompaniment; accompaniment alone).

—Any scale or mode with a tetrachord in each hand; major, minor, Phrygian, Lydian and Locrian pentachords from any note (both hands); cadences in all keys.

End of second year.

—Independently-prepared repertoire at the approximate difficulty of Toronto or Western Board Grade VII.

—Sight-reading at the approximate difficulty of Toronto or Western Board Grade V.

—Transposition of pieces at the above sight-reading level to most other keys.

—Improvisation of accompaniments utilizing more extensive harmonic and contrapuntal vocabulary (melody and accompaniment; accompaniment alone).

—Complete scales in any mode (including major and minor), two octaves, hands together.

—Keyboard sequences, including scale harmonization, seventh chords in the key, and circles of dominant sevenths (any key).

The Bachelor of Music Degree

Major in Piano

All students planning to major in piano in the Bachelor of Music program are required to audition for the Keyboard Instruments Division during registration week. Transfer students from other colleges and universities will audition at the same time. Students currently registered in piano performance will be examined by the Division each Spring before the end of the term. The results of these auditions and examinations will determine whether a student will be admitted to the performance program, will be allowed to transfer piano credits from other universities and colleges, or will be permitted to continue in the program. All students in the performance major are on probation during their first two years, regardless of entrance level, and unless accepted standards are met each year will be required to withdraw from the program.

In general, the entrance level corresponds to the Toronto or Western Board Associateship or its equivalent. However, students must realize that they will be accepted contingent solely upon the probability of rapid development during the four-year program. The possession of a diploma of itself is not a guarantee of acceptance.

Students accepted as first-year piano majors will be expected to attain annual levels corresponding approximately to those given below. The works cited are given only as flexible guides to the levels of technical and musical achievement to be attained and do not indicate specific repertoire requirements. Naturally, it is assumed that artistic and musical achievement will keep pace with technical growth at every stage of the student's development.

End of First year. Virtuoso etudes (e.g. Chopin, Op. 10, No. 5); Bach—French Suite No. 3; Beethoven—Sonata Op. 7; Schumann—*Papillons;* Bartok—Bagatelles; Concertos (e.g. Mozart, K. 453).

End of Second Year. Virtuoso etudes (e.g. Chopin, Op. 25, No. 3); Bach—English Suite No. 4: Beethoven—Sonata, Op. 28; Schubert—Sonata, Op. 122; Ravel, Sonatina; Concertos (e.g. Liszt No. I).

End of Third Year. Virtuoso etudes (e.g. Liszt—Paganini Etudes); Bach—Toccata in C minor; Beethoven—Sonata, Op. 57; Brahms—Scherzo, Op. 4; Stravinsky—Sonata; Concertos (e.g. Rachmaninoff No. 2); Vocal and instrumental accompaniments; Piano chamber works. Third year recital.

End of Fourth Year. Virtuoso etudes (e.g. Chopin—Op. 10, No. 2); Bach—Chromatic Fantasy and Fugue; Beethoven—Sonata, Op. 110; Schumann—Kreisleriana; Stockhausen—*Klavierstuecke;* Concertos (e.g. Brahms Nos. 1 and 2); Vocal and instrumental accompaniments; Piano chamber works; Fourth year recital.

In general, entrance auditions and term examinations for piano majors include sight reading and quick study in addition to the performance of prepared repertoire. Third- and fourth-year students will also be required to display skill in transposition and score reading.

First Year

(100)	Theory of Music I	1½
(101)	Theory of Music II	1½
(120)	History of Music I	1½
(121)	History of Music II	1½
(136)	Piano Repertoire I	2
(193)	Music Performance (Piano)	3
	[1]Large Ensemble	1
(100)	English	3
	Elective in Arts	3
		18

Second Year

(200)	Theory of Music III	1½
(201)	Theory of Music IV	1½
(220)	History of Music III	1½
(221)	History of Music IV	1½
(236)	Piano Repertoire II	2
(293)	Music Performance (Piano)	3
	[1]Large Ensemble	1
(200)	English	3
	Elective in Arts	3
		18

Third Year

(300)	Theory of Music V	1½
(301)	Theory of Music VI	1½
(395)	Music Performance (Piano Recital)	5
(149)	Keyboard Harmony and Transposition	1
(249)	[2]Keyboard Accompanying I	1
(161)	Piano Chamber Ensembles	1
	Music Elective	3
	Elective in Arts	3
		17

Fourth Year

(440)	Piano Teaching Methods and Materials	1
(495)	Music Performance (Piano Recital)	5
(349)	[2]Keyboard Accompanying II	1
(161)	Piano Chamber Ensembles	1
	Electives in Arts	6
		14

[1] *Large Ensemble:* Students may elect any one of Music 150 (Orchestra), Music 152 (Wind Ensembles), Music 153 (University Singers) or Music 154 (University Choral Union), with the permission of the Department.

[2] Students may substitute Music 233 (Accompanying on the Harpsichord I) for Music 249 **or** 349.

Major in Organ

A student planning to pursue a career as recitalist, teacher of organ or church organist should enrol in this course.

All students planning to major in organ in the Bachelor of Music program must audition for the Division of Keyboard Instruments during fall registration week. Transfer students from other colleges and universities will audition at the same time. Students will be required to demonstrate a high standard of keyboard proficiency and sufficient background in organ to give evidence of the probability of rapid development. Organ performance majors will be examined each spring before the end of the term. The results of these auditions and examinations will determine whether a student will be admitted to the performance program, will be allowed to transfer organ credits from other colleges and universities, or will be permitted to continue in the program.

Students accepted as organ performance majors will be expected to attain annual levels corresponding approximately to those listed below. In addition to solo repertoire, the areas of sight reading, quick study, score reading and transposition will be tested.

End of First Year. Bach: Trio Sonata No. 1; Mendelssohn: Sonatas No. 1 or 6; Messiaen: *Le Banquet Celeste.*

End of Second Year. Bach: Dorian Toccata; Franck: Chorals; Dupré: Prelude and Fugue in G minor.

End of Third Year. Bach: Fantasia and Fugue in G minor; Hindemith: Sonatas; Durufle: Suite. Third Year recital.

End of Fourth Year. Bach: Trio Sonatas No. 5 and 6; Reger: Fantasia; Messiaen: *Transports de Joie.* Fourth Year recital.

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First Year			Second Year		
(100)	Theory of Music I	1½	(200)	Theory of Music III	1½
(101)	Theory of Music II	1½	(201)	Theory of Music IV	1½
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(193)	Music Performance (Organ)	3	(294)	Music Performance (Organ)	4
(171)	Piano	1	(271)	Piano	1
	[1]Large Ensemble	1		Large Ensemble	1
(100)	English	3	(200)	English	3
	Elective in Arts	3		Elective in Arts	3
		17			18

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(400)	Theory of Music VII	3
(301)	Theory of Music VI	1½	(495)	Music Performance (Organ Recital)	5
(394)	Music Performance (Organ Recital)	4	(249)	Keyboard Accompanying I	1
(149)	Keyboard Harmony and Transposition	1	(440)	Piano Techniques	2
(306)	Conducting	2		Electives in Arts	6
(452)	History of Keyboard Music I	1½			
(453)	History of Keyboard Music II	1½			
	[2]Religious Studies	3			
		16			17

[1]*Large Ensemble*. Students will enrol in either Music 153 (University Singers) or Music 154 (Choral Union), with the permission of the Department.
[2]*Religious Studies*. To be elected after consultation with the Departments of Religious Studies and Music. Students are also advised to take one or more non-credit courses from one of the theological colleges on campus after consultation with the Department of Music and the college concerned.

Major in Voice

Before entering this area, students must successfully audition before the Vocal Faculty during registration week, singing music of their own choice. All students in the performance major are on probation during the first two years of the program, regardless of entrance level, and unless accepted standards are met each year will be required to withdraw from the program.

First Year. Tone production and diction are stressed. Song-literature from the early Italian period and from oratorio is usually emphasized. During the first year the student will be carefully evaluated in regard to voice, musicianship and physical stamina for the purpose of determining whether he or she has the combination of talents needed for successful performance.

Second Year. Technical and interpretative studies are continued. The repertory will be expanded as the student's technical facility develops. As the use of foreign language is increased, French and German songs will comprise a larger share of the literature to be studied.

Third Year. Considerable vocal agility, volume, range and pleasing tone quality should be achieved in the third year. Frequent group recitals will be encouraged. Operatic and oratorio arias are a necessary part of the repertoire as well as wide-ranging choices in several languages. Ability to perform contemporary English, Canadian and American songs will be expected. A Third-year recital is required.

Fourth Year. The fourth year should be devoted to the interpretative aspects of singing, supported by a growing technical command. It will be assumed that the student can satisfactorily perform any of the standard repertory for his or her vocal classification. A fourth-year recital is required.

First Year			Second Year		
(100)	Theory of Music I	1½	(200)	Theory of Music III	1½
(101)	Theory of Music II	1½	(201)	Theory of Music IV	1½
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(192)	Music Performance (Voice)	2	(293)	Music Performance (Voice)	3
(171)	[1]Piano	1	(271)	Piano	1
	[2]Large Ensemble	1		Large Ensemble	1
(100)	English	3	(200)	English	3
	[3]French	3		[3]German	3
		16			17

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(494)	Music Performance (Voice Recital)	4
(301)	Theory of Music VI	1½		Large Ensemble	1
(394)	Music Performance (Voice Recital)	4		[4]Chamber Ensemble	1
(306)	Conducting	2		Music Elective	3
(456)	History of Solo Song	1½		Electives in Arts	6
(457)	History of Choral Music	1½			
	Large Ensemble	1			
	[3]Italian	3			
		16			15

[1]*Piano:* A minimum of two years of study regardless of entering level.
[2]*Large Ensemble:* Students will enrol in either Music 153 (University Singers) or Music 154 (University Choral Union).
[3]*Languages other than English:* In certain cases students may concentrate on one or two of the languages required, and the indicated sequence may be altered.
[4]*Chamber Ensemble:* Students will elect either Music 155 (Chamber Singers) or Music 156 (Collegium Musicum: Vocal Ensemble).

Major in Opera

This course of instruction is limited to those students wishing to pursue a career in either performance or production of opera. A successful audition and interview with the director of opera prior to enrolment in course work is required of all prospective Opera Majors. Students enrolled in the Opera Major program will be re-evaluated each Spring to determine whether further advancement in the program will be permitted.

First Year. Vocal development, musicianship, and tone production are emphasized. Stress is laid upon vocal materials best suited to the student's individual requirements and development. Exploration of operatic styles is begun.

Second Year. Technical and interpretive vocal studies are continued. Further exploration of styles in both song and operatic literature is stressed.

Third Year. Considerable vocal development is expected. Production and performance of operatic scenes or complete operas becomes a part of the student's curriculum. Emphasis upon good singing techniques is continued. An increasing number of operatic arias is required as part of the student's vocal repertoire. Styles continue to be stressed. Practical work in movement and acting for the lyric stage is introduced.

Fourth Year. Continued emphasis upon vocal techniques especially upon the vocal-dramatic techniques of operatic vocal literature. Operatic acting skills are further developed. Considerable understanding of representative operatic styles is expected. Performance or production of scenes or complete operas continues.

First Year			Second Year		
(100)	Theory of Music I	1½	(200)	Theory of Music III	1½
(101)	Theory of Music II	1½	(201)	Theory of Music IV	1½
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(192)	Music Performance (Voice)	2	(292)	Music Performance (Voice)	2
(171)	[1]Piano	1	(271)	[1]Piano	1
(135)	Opera Repertoire I	1	(235)	Opera Repertoire II	1
(100)	English	3		Large Ensemble	1
	[2]Italian	3	(200)	English	3
	Large Ensemble	1		[2]German	3
		17			17

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(493)	Music Performance (Voice)	3
(301)	Theory of Music VI	1½	(439)	Opera Workshop II	3
(339)	Opera Workshop I	3	(423)	History of Opera	3
(393)	Music Performance (Voice)	3	(435)	Opera Repertoire IV	1
(335)	Opera Repertoire III	1		Music Elective	3
(336)	Opera Theatre Techniques	3		[3]Elective in Arts	3
	[2]French	3			
		16			16

[1]*Piano:* A minimum of two years' study regardless of entering level.
[2]*Foreign languages:* In certain cases students may concentrate on one or two of the languages required, and the indicated sequence may be altered.
[3]*Elective in Arts:* should be chosen in consultation with opera division adviser.

Major in Orchestral Instrument

The major in an Orchestral Instrument is formulated for the student who plans to become a professional performer or a teacher in schools of music or private studios.

Before entering this course of study, the student must successfully audition for the Faculty. In general, the entrance level corresponds to the Toronto or Western Board Grade X and there must also be the probability of significant development during the years of study at the University.

Students enrolled in this course will be examined each spring by the Faculty to determine who should be allowed to continue in this course of study or be required to change to another program.

Although solo performance is stressed, all students in this program will constantly participate in large and small ensemble activity. Solo recitals are required at the end of the third and fourth years.

A detailed syllabus of repertoire representing standards of expectation in performance during undergraduate study is available upon application to the Department of Music.

	First Year			Second Year	
(100)	Theory of Music I	1½	(200)	Theory of Music III	1½
(101)	Theory of Music II	1½	(201)	Theory of Music IV	1½
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(194)	Music Performance	4	(294)	Music Performance	4
(171)	[1]Piano	1	(271)	[1]Piano	1
	[2]Large Ensemble	1		[2]Large Ensemble	1
	[3]Chamber Ensemble	1		[3]Chamber Ensemble	1
(100)	English	3	(200)	English	3
		16			16

	Third Year			Fourth Year	
(300)	Theory of Music V	1½	(494)	Music Performance	
(300)	Theory of Music VI	1½		(Recital)	4
(394)	Music Performance			[2]Large Ensemble	1
	(Recital)	4		[3]Chamber Ensemble	1
(306)	Conducting	2		[4]Specialized Ensemble	1
	[2]Large Ensemble	1		[5]Music Elective	2-3
	[3]Chamber Ensemble	1		Electives in Arts	6
	[4]Specialized Ensemble	1			
	Elective in Arts	6			
		18			15-16

[1]*Piano:* The secondary instrument must be piano unless the student passes the piano proficiency examination at the end of the first year.

[2]*Large Ensemble:* String students will enroll in Music 150 (Orchestra). Wind and percussion students will enroll in Music 152 (Wind Ensembles) or Music 150 (Orchestra). Admission to either is by audition.

[3]*Chamber Ensemble:* String students will enroll in Music 160 (String Chamber Ensembles). Wind and percussion students will enroll in Music 162 (Wind and Percussion Chamber Ensembles). Students may substitute any other of the chamber ensembles during one of the four years.

[4]*Specialized Ensemble:* String students will enroll in Music 159 (Chamber Strings). Wind and percussion students will enroll in Music 305 (Readings in Orchestral Repertoire).

[5]*Music Elective:* Music 309 (Orchestration and Arranging) is highly recommended as especially appropriate to this major. Additional units of ensemble are not permitted for fulfilling the Music Elective requirement except Music 156 (Collegium Musicum Ensembles), Music 163 (Contemporary Players), and Music 164 (Stage Band). (As noted under **Performing Organizations,** no more than half of the small ensemble credit for the B.Mus. degree may be in Music 164.)

Major in General Studies

This curriculum is designed to provide a general higher education in music and to prepare students for professional work in such relatively ancillary fields as criticism, broadcasting, editing, and similar outlets of professional direction. The degree will allow continuation toward graduate degrees.

All applicants for the Major in General Studies will be required to audition in the area of their greatest competence. Students are required to study for three or four years with the Faculty in a concentration of their own choice: possibilities include piano, organ, voice, guitar, harp, strings, woodwinds, brass, percussion, and some historical instruments such as harpsichord, lute, viola da gamba, early flutes, recorder, and other instruments as instruction is available.

	First Year			Second Year	
(100)	Theory of Music I	1½	(200)	Theory of Music III	1½
(101)	Theory of Music II	1½	(201)	Theory of Music IV	1½
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(182)	[1]Music Performance		(282)	[1]Music Performance	
	(Concentration)	2		(Concentration)	2
(171)	[2]Music Performance		(271)	[2]Music Performance	
	(Secondary)	1		(Secondary)	1
	[3]Large Ensemble	1		[3]Large Ensemble	1
(100)	English	3	(200)	English	3
	[4]Elective in Arts	3		[4]Elective in Arts	3
		16			16

	Third Year			Fourth Year	
(300)	Theory of Music V	1½	(482)	[1]Music Performance	
(301)	Theory of Music VI	1½		(Concentration)	2
(382)	[1]Music Performance			[3]Large Ensemble	1
	(Concentration)	2		[5]Small Ensemble	1
	[3]Large Ensemble	1		[6]Music Electives	6
	[3]Small Ensemble	1		Electives in Arts	6
	[6]Music Electives	6			
	Electives in Arts	3			
		16			16

[1]The concentration instrument is usually the performance field of the student's maximum competence, and the one on which he auditioned to enter the department.

[2]The secondary instrument is normally piano in the first two years unless the concentration is a keyboard instrument. Students with minimal keyboard experience will be placed initially in Piano 141, and will in the second year take Piano 241 (class) or 271 (private), as determined by the level of achievement in 141. Students with some previous piano experience may be excused from all or part of the piano requirement by showing satisfactory proficiency in all of the second-year secondary piano requirements, including technique, repertoire, keyboard harmony, score reading, sight reading, and transposition. (For further details, address enquiry to the faculty coordinator, keyboard performance division.)

[3]The large and small ensembles chosen are normally those most appropriate to the student's concentration instrument. Exceptions can occasionally be made after consultation with the student's adviser, and with some consideration being given to the needs of the ensembles. **Students completing concentrations in historical instruments will take three units of small ensemble (usually Collegium Musicum, starting in the second year) and three units of large ensemble.**

[4]The electives in Arts may be freely chosen, after consultation with the student's adviser, except that at least six units must be in the same department, with at least three of these at the 200-level or higher. If English is chosen to fill this requirement then six units must be selected beyond those necessary to complete the English 200 requirement. Students wishing to continue to a career in elementary education will be permitted to count a maximum of 6 units of approved courses in the Faculty of Education (excluding Music Education) in place of Arts electives.

[5]Subject to waiver as to suitability of the concentration instrument and on grounds of availability of instruction and individual need; where such waiver is implemented either as the result of student petition or action of the Head, Department of Music, the fourth-year Music elective will be increased from six to seven units.

[6]A maximum of three of the units of Music elective may be fulfilled with additional units of large or small ensemble, provided authorization is given by the Head, Department of Music, for small-ensemble instruction beyond the required units. Any number of units in this area may be elected, again assuming administrative permission for elective small-ensemble study, where the student wishes to exceed the total 64-unit requirement. **Students completing keyboard concentrations must take Music 149. Those completing harpsichord concentrations must take Music 233 and 333.** Those wishing to concentrate on historical instruments are advised to take six units of music history courses (from Music 350, 352, 353, 354, and 355) as part of their music elective. Provided authorization is given by the Head, Department of Music, students can take a maximum of one unit of Music Performance (Secondary) in each of the third and fourth years, in partial fulfillment of the 6-unit music elective requirements in those years.

Major in Secondary Music Education

This five-year program, administered jointly by the Department of Music in the Faculty of Arts and the Department of Visual and Performing Arts in the Faculty of Education, is designed to prepare students to teach in Secondary Schools. Admission into the program is determined by the Department of Music and applicants must meet the entrance requirements of the Bachelor of Music program described above. Continuation in the program each year thereafter is subject to the approval of both

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departments. In the first three years of the program the student will register in the Department of Music; those continuing to the fourth year will enroll **either** for the degree of B.Ed. Secondary with Music Major (and choose electives in Education from the list of Fifth Year electives in the B.Ed. Secondary program) **or** for the degree of B.Mus. (and choose appropriate electives in Music). Certification will result from the successful completion of either degree.

First Year		Second Year		Third Year	
English 100	(3)	[3]English	(3)	Music 300	(1½)
Music 100	(1½)	Music 200	(1½)	Music 301	(1½)
Music 101	(1½)	Music 201	(1½)	Music 382	(2)
Music 120	(1½)	Music 220	(1½)	Music 371	(1)
Music 121	(1½)	Music 221	(1½)	Music 102, 112,	
[1]Music 171 (or 141)	(1)	Music 102, 112,		or 122	(2)
Music 182	(2)	or 122	(2)	Music 306	(2)
Large Music		Music 282	(2)	Large Music	
Ensemble	(1)	[1]Music 271 (or 241)	(1)	Ensemble	(1)
Music Education 103	(1)	Large Music		Educational	
Arts elective	(3)	Ensemble	(1)	Psychology	
	17	Educational Studies		301/302	(3)
		200	(3)	Education 298	(0)
			18	Arts elective	(3)
					17

Fourth Year		Fifth Year	
Music 471	(1)	Educational Studies 400, 430,	
Music 482	(2)	or 470	(3)
Music 102, 112, 122, or		Music Education 401	(3)
Music Education 303	(2)	Education 404	(3)
Large Music Ensemble	(1)	Music or Education elective	(3)
Small Music Ensemble	(1)	Education elective	(3)
Music or Education elective	(3)	Education 499	(0)
Education 498	(0)	Music Education 302	(2)
Arts elective	(3)		17
[4]Educational Psychology 332 or			
Psychology 301	(3)		
	16		

[1]For students with insufficient piano experience the secondary instrument must be piano for at least two years, beginning with Piano 141. The secondary instrument is normally piano in the first two years unless the concentration is a keyboard instrument. Students with some previous piano experience may be excused from all or part of the piano requirement by showing satisfactory proficiency in all of the second-year secondary piano requirements, including technique, repertoire, keyboard harmony, score reading, sight reading, and transposition. (For further details, address enquiries to the faculty coordinator, keyboard division.)

[2]Some study of guitar is recommended.

[3]An English course (or courses) at the 200 level.

[4]Election of Psychology 301 will require prior completion of a prerequisite course among the Arts electives in year 1 or 3: Psychology 100, 200, 206, or 260. One may also be admitted to Psychology 301 with the instructor's permission.

Major in Music History and Literature

This four-year curriculum is formulated for the student planning to continue after graduation in the area of musicology and wishing to obtain graduate degrees in music with the ultimate aim of teaching in a university.

The student in this area must obtain a wide theoretical knowledge, a comprehensive background in musical history, and a working knowledge of piano, and should possess an intense interest in other musical areas, art, literature, and philosophy. A reading knowledge of both French and German is required before graduation.

As university professors often instruct in more than one musical field, a student in this program should obtain strength in at least one additional musical area, such as performance or theory. These areas may be strengthened further in graduate study.

Very few students will know whether they are suited for this program during the first year, but the course of study in all areas is so planned as to allow a change to another area after the completion of the first year without loss of time or credit.

	First Year			Second Year	
(100)	Theory of Music I	1½	(200)	Theory of Music III	1½
(101)	Theory of Music II	1½	(201)	Theory of Music IV	1½
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(182)	[1]Music Performance	2	(282)	Music Performance	2
	[2]Large Ensemble	1		Large Ensemble	1
(100)	English	3	(200)	English	3
	[3]French or German	3		French or German	3
		15			15

	Third Year			Fourth Year	
(300)	Theory of Music V	1½	(400)	[7]Theory of Music VII	3
(301)	Theory of Music VI	1½	(482)	Music Performance	2
(382)	Music Performance	2		Chamber Ensemble	1
	[4]Chamber Ensemble	1		Music History Electives	6
	[5]Music History Electives	6		[8]Electives in Arts	6
	[6]Political History	3			18
		15			

[1]*Music Performance:* Students must study in some field of performance, which must include piano unless the student can demonstrate proficiency commensurate with requirements of Music 241 (Class Piano II) to the satisfaction of the keyboard division. (For details of requirements of Music 241, address inquiry to the faculty coordinator, keyboard performance division.) Available performance fields include voice, piano, orchestral instruments, and some historical instruments such as harpsichord, lute, viola da gamba, early flutes, recorder, and other instruments as instruction is available.

[2]*Large Ensemble:* Students will enrol in Music 150 (Orchestra), 152 (Wind Ensembles), 153 (University Singers), or 154 (Choral Union), depending upon the student's major performance field.

[3]*Languages other than English:* If one of these languages was studied in high school, it is recommended that the other be elected in the University.

[4]*Chamber Ensemble:* To be elected depending upon the student's performing field.

[5]*Music History Electives:* Music 350, 352, 353, 354, 355, 356 and 357 must be elected.

[6]*Political History:* While there is no limit to the amount of political and social history the musicologist should know, the student is advised to take at least one general history course after consultation with the Department of Music.

[7]*Theory of Music VII:* In exceptional circumstances Music 402, Special Projects, may be substituted for Music 400.

[8]*A course in the history of fine arts is strongly recommended.*

Major in Composition

This four-year program is formulated for the student with particular capabilities in creative writing.

A student will not be allowed to enrol in this course unless ability in composition has already been demonstrated, although it is possible to enter it in the second year if the student has demonstrated creative ability in Music 100 (Theory of Music I), during the first year of another program.

Composers will have opportunities to hear their works performed by ensembles of students and faculty during their four years at the University. Before graduation, a student majoring in Composition must present a full-length program (no longer than one and one-half hours with intermission) of original compositions approved by the Department of Music.

Two copies of each approved work must be presented to the Department of Music, for retention in the Music Library. All presentation copies must be inked or reproduced for permanence.

	First Year			Second Year	
(107)	[1]Composition I	3	(207)	Composition II	3
(100)	Theory of Music I	1½	(200)	Theory of Music III	1½
(101)	Theory of Music II	1½	(201)	Theory of Music IV	1½
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(182)	[2]Music Performance	2	(282)	[2]Music Performance	2
	[3]Large Ensemble	1	(309)	Orchestration	2
(100)	English	3		[3]Large Ensemble	1
	Elective in Arts	3	(200)	English	3
		18			17

	Third Year			Fourth Year	
(300)	Theory of Music V	1½	(400)	Theory of Music VII	3
(301)	Theory of Music VI	1½	(407)	Composition IV (Recital)	3
(307)	Composition III	3	(482)	[2]Music Performance	2
(382)	[2]Music Performance	2	(306)	Conducting	2
	[3]Large Ensemble	1		[3]Large Ensemble	1
	[4]Music Elective	3		Elective in Music	3
	Elective in Arts	6		Elective in Arts	3
		18			17

[1]*Composition I:* It is possible to commence a major in composition after one year in

another field. In such a case the Composition Division will decide whether the student must take all four composition courses.

[2]*Music Performance:* At least one unit of piano is required each year.

[3]*Large or Small Ensembles:* The ensemble requirement is defined as 1 unit of large ensemble, 1 unit of small ensemble, and 2 units of either.

[4]*Elective in Music:* Music 328 (at least 1½ units) is recommended as the third-year music elective.

Major in Music Theory

The program effectively begins in the third year of undergraduate study since in the first two years the student takes a general program. In order to be admitted to the major in theory, except by special permission of the division, the student must have an overall second-class average in each of the first two years, and first-class marks in Music 100, 101, 200 and 201.

Requirements for graduation with the B.Mus. in Music Theory include: (1) overall second-class average in each of the third and fourth years, and (2) successful completion of a fourth-year theory project. This project will be undertaken as Music 402 or 449, but the work should be read and approved by one faculty member in addition to the 402 or 449 supervisor. In appropriate cases the project may involve composition or performance.

	First Year	
(100)	Theory of Music I	1½
(101)	Theory of Music II	1½
(120)	History of Music I	1½
(121)	History of Music II	1½
(182)	[1]Music Performance	2
(141)	[2](Class Piano)	(1)
	Large Ensemble	1
(100)	English	3
	[3]Elective in Arts	3
		15 or 16

	Second Year	
(200)	Theory of Music III	1½
(201)	Theory of Music IV	1½
(220)	History of Music III	1½
(221)	History of Music IV	1½
(282)	[1]Music Performance	2
(241)	(Class Piano)	(1)
	Large Ensemble	1
(200)	English	3
	[3]Elective in Arts	3
		15 or 16

	Third Year	
(300)	Theory of Music V	1½
(301)	Theory of Music VI	1½
(107)	Composition I	3
(382)	[1]Music Performance	2
	Large or Small Ensemble	1
	[4]Keyboard Harmony	1
	[3]Electives in Arts	6
		16

	Fourth Year	
(400)	Theory of Music VII	3
(309)	Orchestration	2
(482)	[1]Music Performance	2
	Large or Small Ensemble	1
	[5]Music Elective(s)	3 or 1½
	[5]Theory Project	1½ or 3
	[3]Elective in Arts	3
		15½

[1]The music performance requirement will be fulfilled by four years of study on the student's principal instrument.

[2]Class Piano 141 and 241 will be required of students whose principal instrument is not a keyboard instrument. The purpose is to prepare students for the study of keyboard harmony in the third year. Students with some keyboard background may be allowed to take Piano 171 and 271 instead. Students whose principal instrument is a keyboard instrument will not study a secondary instrument except as an extra course.

[3]The program provides for 15 units of Arts electives or 13½ units of Arts electives and Physics 341. Physics 341 must be taken if offered. Students must have at least 6 units of credit in one department other than Music. If English courses are elected to complete this 6-unit concentration requirement, they must be in addition to English 100 and 3 additional units of English. In addition to these elective requirements, it will be advisable for students contemplating graduate study in theory to study some German.

[4]Students with the required keyboard proficiency may meet the keyboard harmony requirement of the third year by electing and passing Music 149. Other students should elect Music 343 or its equivalent as provided by the department.

[5]Fourth-Year students have the option of electing 3 units of music electives and doing a one-term (1½-unit) 402 project, or of electing only 1½ units of music elective and doing a two-term project (as Music 449, for 3 units). Appropriate scope for the project will be the determining factor here, and will be decided by the student and the adviser in consultation.

PHILOSOPHY

The Department of Philosophy offers programs of study that lead to the degrees of Ph.D., M.A., B.A. Brochures giving details of each program, descriptions of courses and other information are available from the Departmental office. Students considering graduate work in Philosophy at U.B.C. should see requirements under Graduate Studies, Philosophy.

Requirements for the degree of Bachelor of Arts:

Major

First and Second Years:

Philosophy 250 and any three units from Philosophy 100, 102, 115, 210, 214. If Philosophy 250 has not been taken in Second Year, Philosophy 350 may be taken in Third Year, but will not count toward the 15 units of Third and Fourth year courses required for the Major.

Third and Fourth Years:

Philosophy 301
Philosophy 350, if Philosophy 250 not taken in Second Year
4½ units from Philosophy 302, 333, 343, 353, 363, 420, 450 or 451, 460, 470.
Additional units in Third-Year and Fourth-Year Philosophy courses (exclusive of 350, 410 and 411) or Greek 407 (only 1½ units from Greek 407 may be counted towards the major in Philosophy) or Classical Studies 436 to bring total of Third- and Fourth-year courses to at least 15 units. Only one of Greek 407, Classical Studies 436, Philosophy 323, and Philosophy 355 may be counted toward the 15-unit Major program in Philosophy, except with the permission of the Department.

Honours

First and Second Years:

Philosophy 250 and three units from Philosophy 100, 102, 115, 210, 214

Third and Fourth Years:

Philosophy 302 or 402
6 units of tutorial work (Philosophy 330 or 430)
Additional units in Third- and Fourth-Year Philosophy courses (exclusive of 350 and 410) or Greek 407 (only 1½ units from Greek 407 may be counted towards the Honours degree) or Classical Studies 436 to bring total of Third- and Fourth-Year courses to at least 18 units. Only one of Greek 407, Classical Studies 436, Philosophy 323, and Philosophy 355, may be counted toward the 18-unit Honours program in Philosophy, except with the permission of the Department.
There is an oral examination at the end of each year's tutorials.

POLITICAL SCIENCE

The Department of Political Science offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Requirements for the degree of Bachelor of Arts:

Major

Second Year:

Political Science 200 (1½), and two from 220 (1½), 240 (1½), 260 (1½), 280 (3)

Third and Fourth Years:

15 units in courses in Political Science numbered 300 and above

Honours

First and Second Years:

As for the Major—with a minimum of First or Second Class in a full course (3 units) or a First or Second-Class average in two 1½-unit courses in Political Science and an overall Second-Class standing or better.

Third and Fourth Years:

36 units including:
Political Science 340
Political Science 380
Political Science 390, 490, 491
4½ additional units in Political Science (only 3 units may be offered for credit in Political Science from courses offered by other departments),
15 additional units, of which at least 6 must be taken in other departments

To continue in the Honours program a student must achieve a Second-Class standing or better in Third year. Occasionally, an outstanding student from the Third year Major program may be admitted to Fourth year Honours. A student considering taking Honours should consult the Department's adviser for Honours students.

Honours in Political Science with International Relations

Admission:

An overall second-class standing or better with a reading knowledge of a modern foreign language

First or Second Class in Political Science 260
Two of: Political Science 200 (1½), 220 (1½), 240 (1½), 280 (1½)
3 units from History 100-199, chosen in consultation with an adviser in the International Relations Program.
Asian Studies 105, 206, Economics 100 are recommended.

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Third and Fourth Years:
36 units including:
Political Science 340 and 380
6 units from: Political Science 360-366, 460-464
Political Science 390, 490, 491
History 430
Any two of the following:
Asian Studies 405, 417
Economics 355 (1½), 388, 440, 455 (1½) and 456 (1½)
Anthropology 412, 430 (Note prerequisites; by Anthropology Department permission only)
Geography 329 (1½) and 353 (1½)
History 334, 432
Psychology 308, 408
Sociology 461

Courses Offered:
Political Theory: 240, 340, 342, 344, 346, 440, 442, 444, 446, 521, 522, 523.
Public Administration: 302, 531, 532, 533.
Canadian Government: 200, 303, 304, 305, 306, 307, 401, 402, 403, 404, 405, 470, 501, 502, 503, 504.
International Relations: 260, 361, 362, 363, 364, 365, 366, 460, 461, 462, 463, 464, 465, 561, 562, 563, 564, 565.
Political Behaviour: 280, 380, 381, 385, 551, 552, 553, 571, 572.
Comparative Government: 220, 320 321, 322, 323, 324, 325, 326, 327, 328, 420, 421, 422, 423, 424, 425, 511, 512, 513, 514, 515, 516.
General Courses: 390, 490, 491, 540, 549, 580, 649.

The Department issues each May a mimeographed pamphlet to inform students in detail about courses beginning the following September. Students should obtain a copy before choosing courses.

PORTUGUESE—see Hispanic and Italian Studies.

PSYCHOLOGY

The Department of Psychology offers programs of study that lead to the degrees of Ph.D., M.A., B.A., B.Sc.

For information about the degree of Bachelor of Science language requirements and prerequisites, see the **Faculty of Science** section of the Calendar.

Requirements for the Degree of Bachelor of Arts:
Major
First and Second Years:
Psychology 100 is recommended
Psychology 200

Third and Fourth Years:
Psychology 316 (To be taken in third year).
At least 12 additional Psychology units including:
at least one of: Psychology 300, 301, 303, 305 or 308;
at least one of: Psychology 304, 306, 307, 309, 310, 313 or 360.

Honours

The Honours Program is designed to provide intensive and extensive preparation in Psychology for outstanding students and is especially recommended for those students who intend to pursue graduate studies in Psychology.

Admission to the Honours Program requires at least a high second-class average (75% or better) in the second year and a first-class standing in Psychology 200. Students failing to meet either of these criteria may petition for admittance into the program. All students enrolling in the Honours Program must consult the Chairman of the Departmental Honours-Majors Committee.

Graduation in the Honours Program as described below requires: (1) 24 units of Psychology courses numbered 300 or above; (2) at least a high second-class average in each of the last three years; (3) at least high second-class standing in Psychology 316 and first-class standing in at least one Psychology course taken during the third year; and, (4) first-class standing in at least two Psychology courses taken during the fourth year.

First and Second Years:
Psychology 100 is recommended
Psychology 200
3 units of Mathematics (100 and 101 recommended)
Biology 101 or Biology 102 or a passing score on the Biology placement examination.

*Third Year:**
A minimum of 18 units taken concurrently including:
Psychology 312
Psychology 316 (Honours section)

*Fourth Year:**
A minimum of 18 units taken concurrently including:
Psychology 449
At least 3 units of a psychology laboratory course numbered above 400

*In addition, during third and fourth years, an honours student must take:
At least two of: Psychology 300, 301, 303, 305, 308, 401, or 421
and at least two of: Psychology 304, 306, 307, 309, 310, 313, or 360.

General prerequisites for all 300- and 400-level courses

Psychology 200 or 260 or consent of instructor is a prerequisite for all 300 and 400-level courses except for the following:
(1) Psychology 100, 200, 260 or 206 all serve as acceptable prerequisites for 300, 301, 305, 308, 320, and 321.
(2) Psychology 200, 260 or 206 (or consent of instructor) is prerequisite for 304, 401, and 420.
(3) Psychology 412 has no prerequisites.

Additional prerequisites are required for some courses; see course descriptions.

Note: Students with fewer than 18 units of previous credit may not take 300-level courses; students with 18-20 units of previous credit may take up to three units of 300-level courses. Third year students may not take 400 level courses except that Third Year students may take 415 or 417 with permission of the instructor.

Supplemental Examinations

Since in Psychology courses the final examination contributes less than 40% of the course grade, no supplemental examinations are provided.

RELIGIOUS STUDIES

The Department of Religious Studies offers programs of study that lead to the degrees of Ph.D., M.A. and B.A.

Requirements for the degree of Bachelor of Arts:
Major
First and Second Years:
Religious Studies 100 or Religious Studies 202 AND 204.

Third and Fourth Years:
Religious Studies 370 (to be taken in the Third Year) plus 12 units to be selected from Religious Studies courses numbered 300 and above (except 390 and 391).

Honours
Admission:
Religious Studies 100 or Religious Studies 202 AND 204. Continuation in Fourth Year Honours is conditional upon maintaining at least a second-class standing.

Third and Fourth Years:
A program will be devised for each student, consisting of 18-30 units and including Religious Studies 370 (to be taken in the Third Year) and a graduating essay, Religious Studies 499. Depending on his program the student may be expected to acquire a reading knowledge of Sanskrit, Classical Chinese, Biblical Hebrew, Greek or Latin as well as a reading knowledge of French or German. (For courses in these languages, see the listings of the appropriate departments.)

Undergraduate Courses:
General: 100, 390, 391.
Near East Religions: 202 and
Hebrew Bible and the Ancient Near East: 300, 303, 306, 403.
New Testament: 314, 315, 414, 415.
Hebrew: 305, 405, 479.
Judaism: 308, 407, 408, 409.
Islam: 340, 341, 448, 449.
Christianity (Post-Biblical): 205, 321, 323, 326, 327, 420, 421, 422, 425.
Asian Religions: 204, 364 and
Hinduism: 354, 452.
Buddhism: 363, 431.
Religions of China: 365, 366, 430.
Religions of Japan: 361, 367.
Major and Honours: 370, 479, 499.

ROMANCE STUDIES—see Hispanic and Italian Studies

RUSSIAN—see Slavonic Studies

1986-87

SLAVONIC AREA STUDIES

There are two approaches to Slavonic Area Studies training at the University of British Columbia. Students **either** major in a discipline and supplement their training by taking appropriate courses in Slavonic languages and/or other Slavonic area studies courses as their electives, **or** they may take the Slavonic Area Studies Major described below. In either case, students should consult the appropriate program adviser. Students hoping to go on to graduate study will find it advantageous to have a strong background in a discipline.

The Major in Slavonic Area Studies is offered for students who wish to combine Russian, Polish, Czech/Slovak, or Ukrainian language training with the study of Soviet, Russian or East European society. Therefore, students majoring in Slavonic Area Studies are urged to take lower-year prerequisite courses in Anthropology, Economics, Geography, History, Political Science or Sociology, depending on which discipline they wish to emphasize within the Slavonic Area Program. Most of the non-language courses listed below are given in departments other than Slavonic Studies.

Requirements for the Degree of Bachelor of Arts.

Major

At least two years of Russian, Polish, Czech/Slovak or Ukrainian (which may be taken in the third and fourth year), or the equivalent. Slavonic Studies 105.
15 additional units in Third- and Fourth-Year Slavonic Area Studies courses chosen from the list below, including Seminar in Slavonic Area Studies (when offered); Geography 394 and **one of** Geography 493 or 494; at least one from: History 324, History 405; one from: Slavonic Studies 340, Political Science 408.
Programs must be approved by one of the faculty members teaching courses in the Program or by the Major Adviser in the Department of Slavonic Studies, Dr. Peter Petro.

Courses:

Slavonic Studies 105 (3) Introduction to Russia and Eastern Europe.
Slavonic Studies 206 (1½/3)**d** Major Russian Writers in Translation.
Slavonic Studies 306 (3) Russian Literature in Translation.
Slavonic Studies 307 (1½/3)**c** Modern East European Literatures in Translation.
Slavonic Studies 308 (1½/3)**d** Tolstoy and Dostoyevsky in Translation.
Slavonic Studies 310 (1½/3)**d** Studies in Russian Culture.
Slavonic Studies 340 (3) The Peoples of the Soviet Union.
Slavonic Studies 446 (1½) Women in Russia.
Slavonic Studies 447 (1½) Seminar in Slavonic Area Studies I.
Slavonic Studies 448 (1½) Seminar in Slavonic Area Studies II.
Economics 387 (1½) The Soviet Economy.
Geography 394 (1½) Geography of the Soviet Union: Thematic Analysis.
Geography 493 (1½) Geography of Eastern Europe.
Geography 494 (1½) Geography of the Soviet Union: Regional Analysis.
History 319 (3) History of Poland, 1505-1921.
History 324 (3) History of East Central Europe in the 19th and 20th Centuries.
History 325 (3) German-Slav Relations from 9th Century to 1945.
History 375 (3) Russia from the Ninth Century to 1689.
History 405 (3) History of Imperial Russia, 1689-1917.
History 408 (3) History of the Habsburg Monarchy, 1273-1918.
History 435 (3) Communist Movements in Russia and Eastern Europe since 1900.
History 438 (3) History of the Soviet Union.
Political Science 325 (1½) Soviet and East European Politics.
Political Science 362 (1½) Foreign Policies of the Superpowers.

Students' attention is also drawn to the following course:
Economics 487 (3) Comparative Economic Systems.

Notes:

The University provides opportunity for graduate work in Slavonic Area Studies in the fields of Geography, History (Russian, Soviet, and East European), Political Science, and Slavic culture. Students wishing to do graduate work in the Area will normally be required to have completed at least two years of a Slavic language (Russian, Polish, Czech/Slovak or Ukrainian) by the end of their first year of graduate work. Students interested in an inter-disciplinary M.A. program should consult the chairman of the Coordinating Committee on Slavonic Area Studies. (Bogdan Czaykowski, Department of Slavonic Studies).

SLAVONIC STUDIES

The Department of Slavonic Studies offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Requirements for the degree of Bachelor of Arts:

Major in Russian

First and Second Years:
Russian 100 and 200, or Russian 110.
Slavonic Studies 110 and Russian 215, or Slavonic Studies 105, or Slavonic Studies 206.

Third and Fourth Years:
Russian 300 and 400; 3-6 units from Russian 303, 305, 315; and at least 6 units in Russian literature courses. Slavonic Studies 310 is recommended.
Students should also consider taking some of the following courses as electives: Linguistics 100 or 420, History 405 or 438.

Major in Slavonic Area Studies

See above

Honours in Russian

Admission:
First- or high Second-Class standing in Russian 200 or 110.
Slavonic Studies 110 and Russian 215; or Slavonic Studies 105 or 206.

Third and Fourth Years:
Russian 300, 303, 305, 315, 400.
Russian 449.
3 units in Slavonic Area Studies.
At least 9 additional units in Russian literature.
Six units in courses outside the Department.
To continue in the Honours program students must obtain at least a second-class average in Russian courses in their third year.
Students are advised to take Linguistics 100 or 420.

Note: Advanced courses in Russian literature will normally require at least two years of Russian.

A knowledge of Russian is not required for Slavonic Studies courses.

For courses in Russian and East European (Polish, Czech, Ukrainian) literature in translation, see **Slavonic Studies** under **Courses of Instruction.**

SOCIOLOGY

The Department of Anthropology and Sociology offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Requirements for the degree of Bachelor of Arts:

Major

Second Year:
Sociology 200.

Third and Fourth Years:
At least 15 units of Sociology, including Sociology 310, 318, 350 and at least one of Sociology 380, 381, 382, 383 normally taken in the third year. Additional majors courses in Anthropology and Sociology taken in consultation with a departmental adviser.

Honours:

Second Year:
Sociology 200.

Admission to Third Year:
High second-class average in first and second years

Third and Fourth Years.
A total of 18 units in Anthropology and Sociology including Sociology 310, 318, 350 and at least one of Sociology 380, 381, 382 or 383, normally taken in the third year; Sociology 449. Other courses to be chosen in consultation with an assigned adviser. Courses outside the department may be taken toward Honours credit with special permission.

Undergraduate Courses:

Sociology 100, 200, 201, 210, 213, 214, 220, 240, 250, 301, 352, 354, 465, and 466 are general courses open to all students. Other courses listed in Courses of Instruction under "Sociology" are intended primarily for students in the Major or Honours program. For these courses Sociology 200 is normally a prerequisite.

Each May the Department issues a mimeographed pamphlet to inform students in detail about courses that will be offered the following September. Students should obtain a copy before choosing courses.

SPANISH—see Hispanic and Italian Studies.

THEATRE

The Department of Theatre offers programs of study that lead to the degrees of Ph.D., M.A., M.F.A., B.A., B.F.A., and the Diploma in Film/Television Studies. In addition the Department offers an M.A. in Film/Television History and Criticism and an M.F.A. in Film/Television Production.

At the undergraduate level, the Department offers four distinct streams of study:
(1) B.A. in Theatre
(2) B.A. in Theatre (Film/Television)

(3) B.F.A. (Acting)
(4) B.F.A. (Design/Technical Theatre)

Requirements for the degree of Bachelor of Arts:

Theatre Major

First and Second Years:
Theatre 120 and 200

Third and Fourth Years:
15 units in Theatre, which must include Theatre 310 and 320.

Film/Television Major

The selection of students for admission to the Film/Television Major program normally takes place during the week before registration. Prospective candidates should contact the Theatre Department to learn of admission requirements and to make appointments for interviews.

First and Second Years
Theatre 230

Third and Fourth Years
Theatre 330, 333, 431, 433 and either 334 or 434.
Three units chosen from: Theatre 310, 320, 350, 400, 405, 410, 450, 455.

Theatre Honours

Admission:
Theatre 120 (First or Second Class standing)
Theatre 200

Third and Fourth Years:
18 units including: Theatre 310, 320, 410, 449.
6 units chosen from: Theatre 400, 405, 430; English 365, 366 or Creative Writing 407 (see special admission procedures under Creative Writing).
Reading knowledge (by the end of the Fourth Year) of one of French, German, Italian, Spanish, Russian, Chinese, Japanese or Greek.

Requirements for the degree of Bachelor of Fine Arts:

The program leading to the B.F.A. degree normally consists of four years of study. The first year is in fact the first year of the B.A. program. Application to enter the B.F.A. program proper is made early in April of the student's first year or the week before registration of the student's second year. The number of places available in the program is strictly limited, hence entry into the program is by selection based on an audition (Acting stream) or an interview (Design/Technical Theatre stream). Unsuccessful applicants will be able to continue into the second year of the B.A. program. Students who have been admitted to the B.F.A. program may revert to the B.A. if this is advisable at the end of the second or the third year.

Prospective candidates may obtain details concerning the principles and procedures governing the selection of students from the Department of Theatre.

Acting

First Year:
Requirements of first year B.A. including Theatre 120 and 200
Second Year:
Requirements of second year B.A. including Theatre 261/262
Third Year:
Theatre 310, 361/362/370 and 3 units of electives
Fourth Year:
Theatre 320, 461/462/470 and 3 units of electives

Design/Technical Theatre

First Year:
Requirements of the first year B.A. including Theatre 120
Second Year:
Requirements of second year B.A. including Theatre 250/251
Third Year:
Theatre 310, 405 and 371 and 6 units of electives
Fourth Year:
Theatre 320 and 471, two courses chosen from Theatre 400, 450, 455 or (with special permission) 505 or 506, and 3 units of electives.

Requirements for the Diploma in Film/Television Studies

Applicants must have completed a Bachelor's Degree program in Arts, Sciences, or Commerce.

The program will take two years of study. No longer than five years should elapse between initial enrolment in the program and attaining the diploma.
Eighteen units of course work are required as follows:

First Year:	*Second Year:*
Theatre 230	Theatre 334
Theatre 330	Theatre 431
Theatre 333	Theatre 433

Enrolment in the program will be limited, and preference will be given to students with strong evidence of creative ability, either in film/television, or in one of the other fine arts. Prospective students should enquire at the Department of Theatre main office for audition materials required and for times when materials are evaluated.

URBAN STUDIES

Urban Studies offers a focus for students who have a keen interest in this field. It is not a degree program.

Course of Studies: A student will normally take Urban Studies 200 in the second year, along with the prerequisite courses for a major. In the third and fourth years, in addition to the major requirements, 12 units of courses focusing on urban questions (including those offered in the student's major department) are required. In the fourth year a student would register for Urban Studies 400.

Urban-oriented courses:

A tentative (and not necessarily exhaustive) list of existing undergraduate courses that can be defined as "urban oriented" appears below. Some of these courses may require prerequisite courses. Students should discuss them with the Department concerned before registering.

Anthropology 310
Architecture 424.
Civil Engineering 470.
Commerce 307, 309, 409.
Economics 374, 480.
Geography 350, 351, 352, 357, 360, 450, 453, 457, 464.
History 445.
Planning 425.
Political Science 306.
Sociology 354, 425.

Students interested in Urban Studies should contact the Senior Faculty Adviser of the Faculty of Arts, or the Chairman of the Urban Studies Committee.

WOMEN'S STUDIES

Women's Studies courses examine the experience of women from the perspectives of the Humanities and Social Sciences. Any number of these credit courses may be taken, but no major is offered. Students interested in Women's Studies are encouraged to contact the Women's Studies office (228-4750) and discuss their interests with a member of the Women's Studies Coordinating Committee.

Course descriptions for each of the courses listed below will be found in this calendar under the appropriate department heading.

A. *Core Courses:* As the titles and descriptions of these courses indicate, they regularly deal with content relevant to Women's Studies.

Humanities
Women's Studies 222 — Introduction to Women's Studies
Women's Studies 224 — Women in Literature
Classical Studies 304 — Image and Reality
French 419 — Women's Literature in France and French Canada
Slavonic Studies 446 — Women in Russia

Social Sciences
Anthropology 213 — Women in Comparative Perspective
Psychology 320 — Psychology of Sex Differences
Sociology 213 — Women in Comparative Perspective

B. *Courses of related interest:* The following are examples of courses that may have a substantial focus on issues relevant to Women's Studies. Interested students should check with the instructor for the specific content in any given year. The Women's Studies office may have information about additional courses offered in a particular year.

Humanities
English 314 — Studies in Fiction
English 363 — Tudor and Stuart Drama
English 421 — Canadian Poetry
Hindi 410 — Readings in Modern Hindi
History 316 — European Social History
History 329 — The Social Development of Canada
History 419 — Great Britain Since 1832
History 431 — Population in History
History 443 — The Family in North America
Philosophy 311 — Philosophy of Art

Social Sciences
Anthropology 214 — The Family in Cross-Cultural Perspective
Anthropology 316 — Political Anthropology
Anthropology 329 — Native Peoples of Canada
Anthropology 413 — Family and Kinship

Family and Nutritional Sciences 220 — The Contemporary Family
Family and Nutritional Sciences 322 — Family Analysis
Family and Nutritional Sciences 404 — Family Sciences Seminar
Home Economics 414 — Aging and the Family
Social Work 302 — Family and Child Welfare in the Modern Era
Sociology 352 — Organizations
Sociology 413 — Family and Kinship
Sociology 453 — Work and Leisure
Sociology 475 — Interpersonal Relations

1986-87

THE SCHOOL OF AUDIOLOGY AND SPEECH SCIENCES

(A School Within the Faculty of Medicine)

ACADEMIC STAFF

JOHN H. V. GILBERT, M.S., Ph.D. (Purdue), L.C.S.T., Dip. Phon., Professor and Director of the School.
ANDRE-PIERRE BENGUEREL, Ing. Diplômé (Swiss Inst. of Tech., Lausanne), M.S. (Kansas), M.A., Ph.D. (Michigan), Professor.
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ELIZABETH D. DUNCAN, B.A., M.Sc., (Brit. Col.), Senior Instructor.

Associate Members of the School
GUY CARDEN, Associate Professor of Linguistics.
DAVID INGRAM, Professor of Linguistics.
NEIL S. LONGRIDGE, Clinical Assistant Professor of Otolaryngology
JAMES J. MILLER, Professor of Physiology
MURRAY D. MORRISON, Associate Professor of Otolaryngology

Clinical Assistant Professors
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Clinical Instructors
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WENDY SWIFT, B.Sc., D.S.P. (Toronto).
FRANCES TOMKINS, L.C.S.T. (Nat. Hosp. Coll. of Speech Sciences).
NEIL WALTON, B.Sc. (W. Ontario), M.Sc. (Brit. Col.).
CAROL WOODWORTH, B.A., M.Sc. (Brit. Col.).

Introduction

The objective of the School of Audiology and Speech Sciences is to train clinical audiologists and speech-language pathologists to work in hospitals, clinics, private agencies, schools, health units, and any other settings where the services of such professionals are considered necessary. It sees this objective being reached by a series of ordered steps, originating with the Bachelor's degree in Linguistics and ending with the Master's degree in Audiology and Speech Sciences.

The Practice of Audiology and Speech-Language Pathology

Audiologists and speech-language pathologists provide the communicatively impaired with professional service best suited to their needs. Such service requires a fundamental understanding of rapidly changing information in speech, language and hearing, as well as in diagnostic and treatment skills. The School's program reflects current knowledge in these areas and continued dialogue with professionals working in the field, and the other six training programs in Canada.

The School holds to the philosophy that the scientific and professional field of audiology and speech-language pathology is primarily concerned with the understanding and use of language. This involves the various levels of physiological and psychological organization of language: phonetic, phonological, syntactic, semantic, and pragmatic, and both vocal and sign modalities.

The School requires that its graduates be familiar with current research on speech, language, and hearing, and demonstrate clinical competence.

The School maintains that an understanding of the theories and applications of linguistic knowledge, supported by primary information in acoustics, physiology, perception and cognition — provides a firm base from which the student can build outwards to some more specialized area of their chosen professional field.

Clinical Training

The objective of the clinical training is to develop in each student the ability to use a scientific approach in a clinical context by: a) acquiring pertinent data, b) analysing and interpreting data, c) identifying and defining problems, and d) identifying and implementing methods of problem treatment.

The program provides each student with at least 300 hours of clinical experience in a variety of settings. The first year of the program includes individual and group observations of local audiologists and speech-language pathologists in the

Lower Mainland. These observations serve to acquaint the student with different settings in which an audiologist or a speech-language pathologist may work. They also introduce the student to a variety of diagnostic and treatment techniques. In the summer between first and second year, each student completes three different six-week supervised clinical internships, with at least one internship in audiology and one in speech-language pathology; the third internship is determined by the student's major area of interest. During each clinical internship the student gradually assumes responsibility for most of the clients seen in the forty-hour work week.

In the second year, the student chooses *either* audiology *or* speech-language pathology as a major. Over the two terms, the student completes the equivalent of forty-eight work days in internships, divided between at least two different clinical settings. During these internships, the student assumes a full caseload under clinical supervision. The clinical training program strives to provide the students with experience in all aspects of their selected major.

Master's Degree Program

The School of Audiology and Speech Sciences offers a two-year full-time graduate program leading to a Master of Science (M.Sc.) degree. *The program is designed for full-time students only*. There is no provision for part-time studies. During the first year, all students follow the core-curriculum of the School. In the second year, students choose either audiology or speech language pathology as their major.

Ph.D. Program

The School of Audiology and Speech Sciences offers a program leading to the Ph.D. degree, with specialization in one of the following areas: experimental phonetics, speech production, speech perception, neurolinguistics, language acquisition, psychoacoustics and physiological acoustics.

Details are available on application to the School.

Undergraduate Preparation

Applicants should possess appropriate undergraduate preparation with a cumulative average of *at least* 73% over the last two years of a 4-year undergraduate degree.

A number of courses are considered appropriate preparation for graduate work in Audiology and Speech Sciences. U.B.C. and UVic students should have completed the Speech Science major offered by the Linguistics departments at these universities. Students from other universities should have a degree in linguistics. Students intending to apply for admission to the program in Audiology and Speech Sciences at U.B.C. are required: (1) to have completed the starred (*) first year science courses listed below; and (2) to develop an undergraduate major in linguistics which will encompass at least those courses marked by a star (*) in the following list; the courses not starred are highly recommended to supplement the starred courses. Numbers in parentheses refer to U.B.C. course numbers.

1. **SCIENCES**
   - *1st Year Calculus (MATH 100/111 and 101)
   - *1st Year Physics (PHYS 110/115)
   - *1st Year Biology (BIOL 101/102)
   - 1st Year Computer Science (CPSC 114 and 116)
   - 1st Year Statistics

2. **LINGUISTICS**
   - *General Linguistics: Phonology and Grammar (LING 200)
   - *Studies in Grammar: Morphology and Syntax (LING 300)
   - *Phonetics: Theory and Practice (LING 310)
   - *Biology of Language (LING 315, formerly LING 410)
   - *Language Acquisition in Children (LING 350)
   - *Studies in Phonology I (LING 400)
   - *Three additional units in Phonology or in Syntax (LING 301 or 401)
   - Sociolinguistics (LING 445)

3. **PSYCHOLOGY**
   - *Experimental Psychology (PSYC 200)
   - *At least one of the following three courses:
     - Developmental Psychology (PSYC 301)
     - Brain and Behaviour (PSYC 304)
     - Sensation and Perception (PSYC 313)

   Other recommended courses:
   - Cognitive Processes (PSYC 309)
   - Methods and Research (PSYC 316)
   - Physiological Psychology (PSYC 360)
   - Psycholinguistics (PSYC 521)

For precise information concerning course listings at universities other than U.B.C., students should contact the School at U.B.C. or the department(s) involved in teaching in the areas of linguistics and psychology, at those universities.

Application for Admission

All documents for an application must be received by March 31. It is the responsibility of the applicant to ensure that all documents sent are received by the School. The School will send notices in March, to verify materials received to date. Application before January 15 is mandatory for outstanding students (with First Class standing) who would like to be recommended for a University Graduate Fellowship. Notification about the outcome of the application will be sent sometime in May. The documents to be sent are:

(1) An application form, completed and signed.
(2) Three letters of reference, at least two of which should be written by professors who taught the applicant in the last two years of university work.
(3) Transcript(s) of all college level institutions attended. If still attending university at the time of application, the most recent transcript available from that institution should be sent, as well as a list of the courses in which the applicant is currently enrolled, including standing at the time of application. An official and complete transcript should be sent as soon as available, even if the application deadline has passed.
(4) A written statement of up to 500 words indicating why the applicant wishes to study audiology and speech-language pathology, the aspects of the field which are of particular interest to the applicant and any other fact relevant to the applicant's choice. This statement should also include which professionals (audiologist(s) *and* speech-language pathologist(s)) the applicant has observed in the course of their practice (see detail below).
(5) A "List of prerequisites to the M.Sc. program" (obtainable from the School) completed to the best of the applicant's knowledge, as well as the applicant's intentions regarding the prerequisites not taken so far.

Some applicants may wish to include a resumé providing more detail concerning previous education and employment than can be included on the application form.

The completed application and reference forms, and official transcripts should be returned to the Office of the Dean of Graduate Studies, University of British Columbia, 235-2075 Wesbrook Mall, Vancouver, B.C., V6T 1Z3, in time to reach the School by March 31. Late applications will be considered only insofar as places are still available.

In addition, a prospective student must make arrangements to: (1) discuss the profession with both practising Audiologists and Speech-Language Pathologists; and (2) observe these professionals at work. Applicants who have not completed this exercise by March 31 will not be considered.

Students accepting an offer of admission to the M.Sc. program in the School of Audiology and Speech Sciences, at the time of acceptance of admission, are required to pay a non-refundable deposit of $100.00 to be applied to the student's first-term tuition.

Inasmuch as the Master of Science program runs for 20 consecutive months, (i.e. two academic years, from September through April plus the intervening summer), it is advisable that the student have made appropriate financial arrangements prior to the beginning of the first year, since this School has no sources of financial support for students. At the present time, this means approximately $10,000/year.

Given the intensive nature of the program, no part-time work should be taken over the two-year period. Students may qualify for Canada Student Loans through their Province of residence. Those students applying for financial assistance (e.g. Canada Student Loan, Provincial Loan), should indicate on their applications that the M.Sc. program covers a period of 20 consecutive months.

Curriculum

All First Year students take the following courses, for which complete descriptions may be found under "Courses of Instruction" in the Calendar (see index).

Term I

AUDI 500 - Acoustic Phonetics
AUDI 502 - Mechanisms of the Auditory System
AUDI 504 - Developmental Phonology
AUDI 505 - Acquisition of Language
AUDI 508 - Clinical Audiology
AUDI 509 - Clinical Speech-Language Pathology
PSYT 510 - Neurological Basis of Human Behaviour

Term II
AUDI 502 - (continued)
AUDI 504 - (continued)
AUDI 505 - (continued)
AUDI 507 - Neurolinguistics
AUDI 508 - (continued)
AUDI 509 - (continued)

Summer Internships (All Students)
AUDI 541 - Clinical Practice in Audiology
AUDI 542 - Clinical Practice in Speech-Language Pathology

In the **second year,** students take those of the following courses corresponding to their selected major. Complete descriptions may be found under "Courses of Instruction" in the Calendar (See Index).

AUDIOLOGY

Term I
AUDI 501 - Instrumental Phonetics
AUDI 503 - Auditory Functions — Selected Topics
AUDI 506 - Speech Perception
AUDI 510 - Advanced Clinical Audiology
AUDI 543 - Advanced Clinical Practice in Audiology

Term II
AUDI 510 - (continued)
AUDI 543 - (continued)

SPEECH-LANGUAGE PATHOLOGY

Term I
AUDI 501 - Instrumental Phonetics
AUDI 506 - Speech Perception
AUDI 511 - Advanced Clinical Speech-Language Pathology
AUDI 544 - Advanced Clinical Practice in Speech-Language Pathology

Term II
AUDI 511 - (continued)
AUDI 544 - (continued)

In addition to course requirements, all students are expected to present *either* an M.Sc. thesis *or* one major essay, in partial fulfilment of the requirements of the program. Those students electing non-thesis option must take a 9-hour comprehensive examination in February of their second year.

Prospective applicants are encouraged to write to:

The University of British Columbia
Graduate Adviser
School of Audiology and Speech Sciences
2075 Wesbrook Mall
Vancouver, B.C. V6T 1W5

1986-87

THE FACULTY OF COMMERCE AND BUSINESS ADMINISTRATION

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THE FACULTY OF COMMERCE AND BUSINESS ADMINISTRATION

The Faculty of Commerce and Business Administration offers courses leading to the degree of:

1. Bachelor of Commerce (B.Com.).
2. Bachelor of Commerce, Bachelor of Laws (B.Com., LL.B.), combined degree with Faculty of Law. See also Faculty of Law.
3. Master of Business Administration (M.B.A.).
4. Master of Science in Business Administration (M.Sc. (Bus.Admin.)).
5. Doctor of Philosophy (Ph.D.).

BACHELOR OF COMMERCE

This five-year program, consisting of a pre-Commerce year in another Faculty and four years in the Faculty of Commerce and Business Administration, is intended for students interested in one of the specialized fields of administrative practice.

The first three years are devoted to laying a foundation in the related sciences and the humanities, and to introducing the student to basic business problems, principles, and practices.

The professional aspects of the curriculum are largely concentrated in the last two years. Because of the breadth and variety of techniques and practices involved, it has been found necessary to specify a "core" of courses which all students must take, and then to arrange a series of carefully selected and integrated programs, known as "options", in which a student must register.

For each option, the necessary prerequisites are specified in the pre-Commerce Year, First Year and Second Year Commerce programs. Required courses in a particular option may be replaced by other courses with the approval of the Director of the Undergraduate Program and, in some cases, the appropriate division chairman.

Admission to the Bachelor of Commerce Program

The faculty has been authorized to restrict enrollment in first and second-year Commerce. ATTAINMENT OF THE MINIMUM ACADEMIC REQUIREMENT LISTED BELOW MEANS THAT THE APPLICANT IS ELIGIBLE FOR SELECTION BUT DOES NOT PROVIDE ASSURANCE OF ADMISSION. The selection is based on academic standing. In most cases the competition for places is such that standing above the minimum prescribed requirement is necessary to ensure admission. **Students previously registered in the Faculty of Commerce who were required to withdraw following a failed year will normally be considered only after other eligible candidates have been placed.**

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Admission from Arts or Science

Students who apply to enter the Faculty of Commerce and Business Administration **from either first-year Arts or first-year Science** must have successfully completed 15 units including: English 100, Economics 100, Mathematics 140 and 141 (or a substitute of Mathematics 100, 101; 120, 121; or Mathematics 111). Note that if Mathematics 111 is taken, then Mathematics 141 must be completed in the first year of Commerce. Mathematics 105, 203, and 204 are not acceptable for either inclusion in the 15 units on which admission to this program is based or for credit toward the Bachelor of Commerce degree. The minimum standing for admission to Commerce is 60 percent (or equivalent) in the pre-Commerce studies.

Students who have completed two or more years in Arts or Science normally must include further work in Economics, English, and Mathematics if their application is to be considered. Information on recommended courses can be obtained from the Undergraduate Office in the Faculty of Commerce and Business Administration. Students are reminded that in planning their program they must comply with the requirement of the faculty in which they are registered.

In making admission decisions, emphasis is placed on performance in the pre-Commerce subjects of Economics, English, and Mathematics.

Admission from College Commerce Transfer Programs

Students who have completed first-year Commerce at a college offering a U.B.C. transfer program are eligible to be considered for admission to second-year Commerce if their average is 60 percent (or equivalent) in the most recent year of studies. **Attainment of the minimum academic requirement means only that the applicant is eligible for selection but does not provide assurance of admission.**

Admission from Commerce Programs at other Universities

Commerce students attending other universities and wishing to transfer to the Faculty of Commerce and Business Administration at U.B.C. will be considered on an individual basis. Students may be admitted with advanced standing as approved by the Director of Undergraduate Programs. The general rule is that all candidates for the degree of Bachelor of Commerce must be in attendance at this university and registered in the faculty for a minimum of at least two winter sessions. Transfer credit will be assessed only after a formal applicaton for admission to the program has been made. Normally, a high second-class standing is required for admission; students who have been required to withdraw from a Commerce program at another university will not be considered.

Discretionary Admissions (B.C. Residents Only)

Mature students who may not meet the normal university or faculty requirements for admission but who have relevant work experience may be considered for admission to the faculty. Enquiries should be made in writing to the Undergraduate Office in the Faculty of Commerce. Admission is normally into first-year Commerce.

Admission from B.C. Grade 12 (or the Equivalent)

Graduates from grade 12 or grade 13 in any Canadian province are not admissible directly to the faculty. Applicants with such standing should apply for admission to first year university.

Application Deadlines

Students applying to enter the Faculty must make formal application to the Registrar of the University no later than May 31.

All necessary documents, including official transcripts, must be received by the Office of the Registrar by June 30 to ensure that the application will be considered.

Classification of Students

(1) **Full:** 15 units constitute a full load in First Year and in Second Year Commerce. In Third and Fourth Year Commerce, students are required to take 16½ units and 18 units respectively. (Because 1 and 2-unit courses constitute a part of the second-year program it may develop that a student may register for 17 units in one year to be followed by 19 units in the next year.)

(2) **Part-time:** any student who takes less than a full course of studies. There is no minimum number of units that must be taken in an academic year.

(3) **Occasional:** This category includes the student who, because of maturity has been permitted to enrol in spite of deficiencies in formal academic record.

Optional Programs

Students who complete the course of studies in any one of the following options will receive the degree of Bachelor of Commerce (B.Com.):

1. Accounting and Management Information Systems
2. Commerce and Economics
3. Commerce and Law (for combined degrees)
4. Computer Science
5. Finance
6. Industrial Administration
7. Industrial Relations Management
8. Marketing
9. Transportation and Utilities
10. Urban Land Economics

Advancement

(1) A student who passes all courses in which he or she is registered in any year but who achieves an average below 55% will be required to withdraw from the Faculty.

(2) A student who does not pass all courses in which he or she is registered and achieves below 60% in the courses passed will be required to withdraw from the Faculty.

(3) A student registered in 15 or more units who receives a failing grade in 6 or more units will be considered to have failed the year and will be asked to withdraw from the Faculty.

(4) A student registered in less than 15 units who receives a failing grade in one-third or more of the units in which he or she is registered will be considered to have failed the year and will be required to withdraw from the Faculty.

(5) Course withdrawals not authorized by the Director of the Undergraduate Program will be considered failures in determining a student's overall standing and advancement potential.

(6) A student who fails a year for the first time will be required to discontinue from study at the University. Readmission may be permitted, at the discretion of the Dean, after a period of one year.

(7) A student at any level of University study who fails for a second time whether in repeating a year or in a later year, will be required to withdraw from the University; readmission will be granted after a period of at least one year if an appeal to the Senate is supported by the Committee for Admissions of the Faculty and upheld by the Senate.

(8) A student who is readmitted after a failed year will only receive credit for those courses in the failed year in which a grade of at least 65% was obtained. A student transferring from another faculty with a failed year on the record will receive credit for those courses in the failed year in which a grade of at least 65% was obtained.

(9) Students will be promoted to the next year if they are deficient no more than 6 units of the requirements of the year they are completing and have completed at least 6 units of the required courses of that year.

Dean's Honour Roll

The words "Dean's Honour Roll" will be placed on a student's transcript if an average of 80% or better has been achieved in the program of an academic year of at least 12.0 units in the first year or second years or 15.0 units in third or fourth years. To qualify, a student must pass in all courses.

The words "with Honours" will be placed on the transcript of record, the degree certificate and the degree parchment of a student graduating with the B.Com. degree where the average over the 34.5 units of the last two years is 80% or better.

Unsatisfactory Standing

(1) If a student's general standing in the final examinations of any year is sufficiently high, the Faculty may grant supplemental examinations in a maximum of 3 units. Notice will be sent to all students to whom supplementals have been granted.

The following rules govern the granting of supplementals:

a) The Faculty may grant supplemental examinations to a maximum of 3 units.

b) In order to be eligible for consideration a student must have at least 40% in the course in question and an average of not less than 60% in all other courses taken during the session.

c) Supplemental examinations are normally provided in Commerce courses where the final examination accounts for 40% or more of the final grade in the course.

d) A supplemental examination will have essentially the same scope as the final examination; will, when written and passed, stand as a substitute for the final examination in any calculation of the final course grade.

e) Information on which courses have supplemental examinations will be published and made available to students in the Guide to Undergraduate Courses.

(2) Any student whose academic record, as determined by the tests and examinations of the first term, is found to be unsatisfactory may be required to discontinue attendance at the University for the remainder of the session.

English Composition Requirement

To qualify for the degree of Bachelor of Commerce, students must satisfy the English Composition requirement of the Faculty of Commerce and Business Administration. To do this students must obtain credit for English 100 or Arts One and must pass the English Composition Test (ECT).

Students (including Transfer Students) who have obtained credit for English 100 or Arts One but who have not passed the Composition Test will write it in late September. The test will also be given during the December Examination period, in late March or April, and in July. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services. Students who have not satisfied the English Composition Requirement at the time of admission to the B.Com. program must do so within one academic year of admission to the Faculty of Commerce and Business Administration.

DEGREE OF B.COM. COMBINED WITH THE DEGREE OF LL.B.

Completion of the pre-Commerce year, of the first three years in the Commerce and Law option (of which the last two years must be spent in residence) in the Faculty of Commerce and Business Administration at U.B.C., and the satisfactory completion of the requirements for the LL.B. degree at The University of British Columbia or its equivalent at another recognized Canadian university are required for the combined degrees B.Com. and LL.B. Courses in Commerce may not be taken concurrently with courses in the Law Faculty.

Students of Universities other than UBC eligible for this program must apply to the Registrar of The University of British Columbia following successful completion of their Law degree and submit an official transcript of record from their University to attest to standing. Recommendation for granting of the B.Com. degree will be made by the Faculty of Commerce and Business Administration to the Senate for authorization of the granting of the degree usually in the Fall.

REGULATIONS REGARDING COMMERCE COURSES

(1) Not later than the end of the Second Year in Commerce, students are expected to choose their field of concentration and thereafter follow the prescribed course of studies. Transfers from one option to another may be made with the approval of the Director of the Undergraduate Program.

(2) Each option program assumes that there is a normal sequence of courses, listed in the Undergraduate Guide. Students are expected to recognize these normal sequences in planning their program. Any exceptions must be approved by the Director of the Undergraduate Programs.

(3) Students may be required to undertake field work in the business community.

(4) A charge may be made for material supplied by the Faculty for use in classes.

(5) All Second Year students are required to attend and complete, to the satisfaction of the Dean, a course in public speaking provided by the Faculty of Commerce and Business Administration.

(6) Courses in Commerce are reserved for students registered in a degree program in Commerce. However, there are exceptions to this general rule.

(a) Special arrangements have been made for students registered in Agricultural Sciences, Applied Science, Forestry, Pharmaceutical Sciences, Home Economics, Education and Physical Education and Recreation. (See appropriate section of the calendar)

(7) Students who have obtained a first class average in their third year may elect, in the fourth year, up to 3 units of 500-level courses chosen in consultation with the Chairman of the Division, the instructor and the Director of the Undergraduate Program.

PROGRAM REQUIREMENTS

Program Approval

The student is reminded of the university rule regarding program responsibility. The student is responsible for the completeness and accuracy of registration as it relates to the regulations of the program in which he/she is enrolled.

Prerequisites

The required courses in First Year Commerce normally are prerequisite to the courses in Second Year. A student with advanced credit should see the Director of the Undergraduate Program about taking Second Year courses in the same academic session as First Year courses.

The required 200-level Commerce Courses generally are prerequisite to 300-and 400-level courses in the same option area. In each option, it is assumed that the required 300-level courses will be taken prior to the 400-level courses. Students should contact the Undergraduate Office for specific information about course prerequisites and variations from normal program sequences.

Any student not registering for a normal sequence of courses must consult the Director of the Undergraduate Program.

Non-Commerce Students taking Commerce courses as a part of a program should contact the Director for information. Prerequisites are not generally shown in the course listings.

First Year Commerce

The first year program will consist of Commerce 110, 120, 151, 153; Economics 201 and 202; Computer Science 101; and 4½ units of electives chosen from any Faculty other than Commerce and Business Administration. Transfer students who have completed a course in Intermediate Economic Theory should contact the Director of Undergraduate Programs.

Students who have not completed Mathematics 141, (or 101 or 121) will take Mathematics 141 in lieu of an elective. Computer Science 114 will be accepted in lieu of Computer Science 101.

Second Year Commerce

The Second Year program will consist of Commerce 211, 212, 220, 254, 261, 271, 291 and three units of electives from a faculty other than Commerce and Business Administration. Commerce 241 is the only Commerce course that may be taken as an elective in second year. Economics 201, 202 normally are taken in First Year Commerce. However, transfer students from another faculty, from another university, or from a college, may take Economics 201, 202 in Second Year Commerce. All students are required to complete a non-credit course in Public Speaking.

Students who have taken a course in Probability or Statistics prior to entering the Faculty of Commerce and Business Administration should see the Director of the Undergraduate program. Students are referred to the course section of the Calendar for courses in Probability and Statistics which normally are not allowed for credit in the Faculty of Commerce and Business Administration.

Third and Fourth Year Option Programs

Normally electives in the Third and Fourth Years shall be chosen from courses numbered 300-level or above. Up to 3 units may be selected from courses at the 200-level. No courses of the 100-level may apply as electives in the Third or Fourth Years. Normally courses at the 100-level may not be taken for credit by a student registered in Third or Fourth years. Electives may be chosen from courses in any Faculty, including Commerce and Business Administration, but at least 6 units must be taken outside Commerce at the 300-level or above.

Accounting and Management Information Systems
Option 1

Third Year	Fourth Year
Commerce 322, 331, 353, 354, 356, 358, 394	Commerce 453, 491, 492
3 units of electives	4½ units from Commerce 355, 357, 450, 451, 452, 454, 455, 456, 459
	6 units of electives

Commerce and Economics
Option 2

Third Year	Fourth Year
Commerce 322, 331, 394	Commerce 491, 492
9 units of Economics including Economics 345	6 units from any 300- or 400-level Commerce courses
1½ units of electives	9 units from Economics 300- or 400-level courses

Commerce and Law
Option 3

Third Year	Fourth Year and Fifth Year
Commerce 322, 394, 491, 492	Courses prescribed for First and Second years in the Faculty of Law of the University of British Columbia
3 units from any Political Science 300-level courses	
7½ units of electives	
(Commerce 331, 332, 333 and 337 are not allowed for credit)	(See Faculty of Law section for admission requirements.)

Computer Science
Option 4

Third Year	Fourth Year
Commerce 322, 331, 356, 394	Commerce 491, 492
Computer Science 220, 304, 310	6 units from Computer Science 300 level or above
1½ units of electives	4½ units from Commerce 300 level or above
	4½ units of electives

Students entering this option will need to take Computer Science 118 (or equivalent), 210 and 213 as electives prior to entering Commerce Third Year as they are prerequisities to Computer Science 304 and 310.

The required 6 units from Computer Science and 4½ units from Commerce in the Fourth Year can be taken partially in Third Year.

Students contemplating this option may take Mathematics 221 instead of Commerce 110; they may take Computer Science 116 (1½) as well as Computer Science 114 (1½) or 101 (1½) plus 118 (1½) as adequate preparation for Computer Science 210 and 213.

Finance
Option 5

Third Year	Fourth Year
Commerce 322, 331, 371, 374, 394	Commerce 471, 491, 492
3 units from Com. 376, 377, 378, or 379	3 units from Com. 472, 475, 476, 478
4½ units of electives (not to include Economics 345)	10½ units of electives

Industrial Administration
Option 6

Third Year	Fourth Year
Commerce 320, 321, 322, 331, 383, 394	Commerce 421, 423, 483, 491, 492
6 units of electives	9 units of electives

Not offered, 1986/87.

Industrial Relations Management
Option 7

Third Year	Fourth Year
Commerce 320, 321, 322, 324, 325, 331, 394	Commerce 421, 423, 425, 426, 491, 492
4½ units of electives	9 units of electives

Students planning to choose this option are encouraged to elect courses in Political Science, Psychology and Sociology during the first and second years of Commerce to permit maximum flexibility in electing 300- and 400-level courses in these fields.

Marketing
Option 8

Third Year	Fourth Year
Commerce 322, 331, 362, 363, 365, 394	Commerce 467, 468, 491, 492
6 units of electives	1½ units from Commerce 462, 463, 465, 466, 469
	10½ units of electives

Transportation and Utilities
Option 9

Third Year	Fourth Year
Commerce 322, 331, 341, 343, 344, 394	Commerce 446, 491, 492
Economics 480	3 units from Commerce 441, 444, 445, 447
4½ units of electives	10½ units of electives

It is recommended that students enrolling in this option complete Commerce 241 in second year.

Urban Land Economics
Option 10

Third Year	Fourth Year
Commerce 307, 309, 322, 331, 337, 394	Commerce 407, 408, 491, 492
Choose one of the following:	Commerce 406 or 409
Commerce 376 or 371, or	Planning 425
Economics 345 or 447.	9 units of electives
4½ units of electives	

Courses offered in various fields of specialization:

Urban Land Economics: 306, 307, 309, 406, 407, 408, 409, 503, 504, 505, 506, 507, 508, 509, 604, 605.

Quantitative Methods: 110, 111, 211, 212, 310, 311, 313, 314, 315, 316, 317, 410, 411.

Industrial Relations Management: 120, 220, 320, 321, 322, 323, 324, 325, 326, 421, 422, 425, 426, 520, 521, 522, 523, 524, 525, 527, 528, 529, 625, 626, 628.

Commercial Law: 331, 332, 333, 337, 432.

Transportation and Utilities: 241, 341, 342, 343, 444, 445, 447, 541, 544, 545.

Accounting and Management Information Systems: 151, 153, 254, 291, 336, 351, 352, 353, 354, 355, 356, 357, 358, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 534, 536, 537, 538, 551, 552, 553, 554, 555, 556, 557, 651, 654, 658, 659.

Marketing: 261, 361, 362, 363, 364, 365, 366, 462, 463, 465, 466, 467, 468, 469, 562, 563, 564, 565, 566, 568, 569, 660, 661, 662.

Finance: 271, 371, 373, 374, 376, 377, 378, 379, 471, 472, 475, 478, 571, 572, 574, 575, 576, 577, 578, 579, 671, 672.

Industrial Administration: 381, 382, 383, 384, 483.

Management and Policy: 394, 396, 490, 491, 492, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598.

Production: 510.

Management Science: 511, 512, 513, 514, 515, 516, 517, 518, 581, 582, 583, 584, 585, 586, 587, 589, 611, 612.

PROFESSIONAL ASSOCIATIONS

1. Institute of Chartered Accountants of B.C.

After obtaining employment with an approved firm of Chartered Accountants —

(a) Graduates of the Accounting and Management Information Systems Option and the Licentiate in Accounting program are required to complete not less than 33 months of registered employment and the program of the School of Chartered Accountancy conducted by the Institute in order to obtain the C.A. designation.

(b) Graduates, other than those mentioned in (a), above, are required to complete the required prerequisite courses before being admitted to the School of Chartered Accountancy. These prerequisite courses are available through the G.A.P. program described later, for candidates possessing a recognized undergraduate degree.

2. Certified General Accountants Association of B.C.

(a) Graduates of the B.Com. program (non-Accounting option) may be granted advance standing toward the C.G.A. designation and the period of required practical experience will be reduced to approximately thirty-six months.

(b) Graduates with the degree of B.Com., Accounting and Management Information Systems Option, may be granted additional advance standing toward the C.G.A. designation. The period of required practical experience will remain at approximately thirty-six months.

3. Society of Management Accountants of B.C.

(a) Graduate of the five-year B.Com. program Accounting and Management Information Systems Option, will be granted certain exemptions for this professional designation. Students enrolling in this program should consult the Society of Management Accountants or the students bulletins available on campus for detailed exemption information.

(b) Graduates of the five-year B.Com. program, any option (other than the Accounting and Management Information Systems), will be granted exemptions to the extent that comparable courses have been completed at the University.

(c) A period of practical experience is required to qualify as a registered member of the Society and at a minimum this will be two years.

4. Real Estate Institute of B.C.

Graduates of the B.Com. Program, Urban Land Economics Option will have satisfied the Educational requirements for membership in the Real Estate Institute of British Columbia. Full membership in the Real Estate Institute of B.C. will require a minimum of three years, continuous experience in a Real Estate related activity. Acceptance into the Real Estate Institute of B.C. entitles the member to use the distinguishing letters R.I.(B.C.) after his name.

Student Membership

All students enrolled in the B.Com. Program, Urban Land Economics Option are entitled to apply for student membership in the Real Estate Institute of B.C. Enquiries may be directed to the Executive Officer.

PROFESSIONAL AND DIPLOMA COURSES

The Faculty operates a number of programs in the professional and managerial fields. Most programs require detailed study over a period of several years at part-time or evening classes. In some cases, correspondence lessons are available. Completion of assignments and examinations is required in most subjects.

Admission requirements vary from program to program. In some cases, registration is limited to residents of the Province of British Columbia.

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DIPLOMA DIVISION COURSES

1. **The Certified General Accountants of British Columbia:** A five-year evening lecture program designed to meet the academic requirements of the Certified General Accountants Association of British Columbia.
2. **The Institute of Canadian Bankers:** Two courses are available — the Business Program for Bankers, two years in length and leading to the designation Associate of the Institute of Canadian Bankers; and the Professional Banking Program, one year in length and leading to the designation Fellow of the Institute of Canadian Bankers.
3. **Marketing and Sales Management:** A three-year, evening lecture program sponsored by the Sales and Marketing Executives of Vancouver, and leading to a diploma in Marketing and Sales Management.
4. **The Graduate Admission Program of the Institute of Chartered Accountants of British Columbia:** A part-time, lecture program providing the prerequisite courses necessary for entry into the School of Chartered Accountancy.

REAL ESTATE COURSES

1. **Real Estate Salesman's and Sub-Mortgage Broker's Pre-licensing Course: A correspondence course meeting the academic requirements for licensing as a real estate salesman or sub-mortgage broker in the Province of British Columbia.**
2. **The Agent's Pre-licensing Course:** A correspondence or lecture course meeting the educational requirements for licensing as a real estate agent in the Province of British Columbia.
3. **Mortgages: A Course for Lenders and Brokers:** A correspondence course meeting the requirements for licensing under the British Columba Mortgage Brokers Act.
4. **The Urban Land Economics Diploma Program:** A four year, lecture or correspondence program in advanced real estate studies.

EXECUTIVE PROGRAMS

Executive Programs offer a variety of short-term, managerial seminars in all disciplines of business administration. Seminars are regularly scheduled at the University of British Columbia, and are also offered on an in-house basis to interested organizations.

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THE SCHOOL OF COMMUNITY AND REGIONAL PLANNING

(A school within the Faculty of Graduate Studies)

Director and Professor
BRAHM WIESMAN, B.Arch., M.Arch. (McGill)

Professors
HENRY C. HIGHTOWER, B.Sc. (London), Ph.D. (N. Carolina).
V. SETTY PENDAKUR, B.E. (Mysore), M.Sc. (Brit. Col.), M.S.C.E, Ph.D. (Washington).
H. PETER OBERLANDER, B.Arch. (McGill), M.C.P., Ph.D. (Harvard), Director, Centre for Human Settlements.

Associate Professors
H. CRAIG DAVIS, B.S.E.E. (Purdue), M.A., Ph.D. (Berkeley).
WILLIAM E. REES, B.Sc., Ph.D. (Toronto), (also Institute of Animal Resource Ecology).
MICHAEL Y. SEELIG, Dip.Arch. (Hammersmith), M.C.P., Ph.D. (Penn.)

Assistant Professors
ANTHONY H. J. DORCEY, M.A. (Aberdeen), M.S. (Wisconsin) (Part-time), Assistant Director, Westwater Research Centre.
J. DAVID HULCHANSKI, B.A., MS.c., Ph.D. (Toronto).

Lecturers
WILLIAM T. LANE, B.A., B.Com., LL.B. (Brit. Col.) (Part-time).
LLOYD BARON, B.Comm. (McGill), M.A. (Michigan), Ph.D. (McGill), (Part-time).
G. GARY RUNKA, B.S.A. (Brit. Col.), M.Sc. (Cornell), (Part-time).

Instructor
NORMAN G. DALE, B.Sc., M.Sc. (Dalhousie).

Adjunct Professors
PETER BOOTHROYD, M.A. (Alberta).
RONALD G. RICE, B.A.S.E. (Toronto), M.Sc. (M.I.T.), Dip. Planning, Ph.D. (Toronto).

Honorary Professors
C. S. HOLLING, M.Sc. (Toronto), Ph.D. (Brit. Col.), Professor of Zoology and Animal Resource Ecology.

Visiting Professors
GERALD HODGE, B.A. (Brit. Col.), M.C.P. (Berkeley), Ph.D. (M.I.T.)
ROY A. LOCKHART, M.A. (Simon Fraser), Ph.D. (Essex).

Honorary Lecturer
O. A. ANDERSON, B.A., Ph.D. (Alberta).

THE SCHOOL OF COMMUNITY AND REGIONAL PLANNING

Introduction

The School of Community and Regional Planning offers a two year professionally oriented Master's Degree program and a research oriented Ph.D. program. The School offers an integrated approach to planning for development as well as specialization in:

— Community planning: concerned with (a) physical planning and development, and (b) urban policy housing and social planning;
— Regional Development planning: concerned with the spatial aspects of socio-economic development;
— Natural Resources planning: concerned with management of natural resources based on an understanding of the behaviour of natural systems, the social and economic context, and the institutional arrangements for decision making.

The School graduated its first students in 1953, and has continuously offered a two-year Master's degree in planning longer than any other Canadian school. Approximately 400 graduates are employed throughout Canada and abroad in a wide variety of teaching, research, planning, policy analysis, and administrative positions in universities, municipal, provincial and federal governments, public and private corporations, and in consulting practices. Many graduates are employed as generalists particularly in municipal and regional planning agencies, but an increasing number are found in more specialized fields such as housing, parks, transportation, social planning and urban design in urban planning; and environmental protection, water resources, land management, northern and native programs in regional development and natural resources planning.

The Environment for Teaching, Learning and Research

Our program of teaching and research strikes a balance between developing the competence required to enter professional practice today, and the intellectual preparation needed to continue to function adequately in increasingly responsible positions in a rapidly changing world. The program covers the substance and methods of community, regional and natural resources planning. We also cover the process and institutional arrangements for planning, its ideological basis, and the role and ethical responsibility of the planner. We are interested in the solution to today's problems as well as anticipating and shaping the future through policy relevant scholarly research.

From the student's point of view, our program has the following salient characteristics:

- opportunities for students with an undergraduate degree in a limited field to broaden their knowledge in order to assume responsibilities in planning and management;
- opportunities for students with a generalist's background to acquire greater disciplinary rigour in a planning-related field of their choice;
- flexibility within a structured format to design a program of studies to satisfy individual needs;
- an emphasis on formal course work, balanced with directed studies, and original research.
- opportunities for joint student-faculty research and publication.

Students are encouraged to become involved in the activities of the University's several research institutes and to enrol in relevant graduate courses in other departments. In resource management there is the Institute of Animal Resource Ecology, Westwater Research Centre and the Resource Management Sciences Committee; in transportation, the Transportation Centre; and in Third World Development, the Institute of Asian Research.

The Master's degree will be either a Master of Arts or a Master of Science, whichever best describes the prerequisites offered by the candidate and the courses chosen.

Prospective applicants should write to:

The Director
School of Community Regional Planning
The University of British Columbia
6333 Memorial Road
Vancouver, B.C.
Canada V6T 1W5

for a brochure containing more information about the field, required qualifications, career opportunities, and course of study.

Master's Degree Program

Application for Admission

A complete application for admission includes:

1) An application by the candidate on a form available from the School.
2) Three confidential recommendations on the candidate's academic qualifications. Forms for this purpose are provided with the application and are sent directly to the University by the referee. Applicants with professional experience are encouraged to solicit additional letters of recommendation.
3) Transcripts of academic work undertaken at institutions other than U.B.C. sent directly to the University.
4) A written statement of up to 500 words indicating why the applicant wishes to study planning, and what aspects of the field are of interest.

Those whose native language is not English and whose previous degree was not earned in an English-speaking country are required to complete the Test of English as a Foreign Language, given four times annually in most major cities. For further information write: T.O.E.F.L., Box 899, Princeton, New Jersey, U.S.A., 08540.

The completed application, reference forms, and official transcripts should be returned to The Director, School of Community and Regional Planning, The University of British Columbia, 6333 Memorial Road, Vancouver, B.C., Canada, V6T 1W5.

Candidates whose applications and supporting transcripts, recommendations and accompanying statement are on hand by the end of January will receive the greatest possible consideration for admission and, if requested, for financial assistance.

Prerequisites for Admission

Admission to the Master's Degree program requires a four year Bachelor's degree with high academic standing. Students are accepted from both the social sciences

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and the natural sciences, and from such fields as commerce, architecture, engineering, agriculture and forestry. Students from other fields could be accepted but may be required to fulfil additional prerequisites.

Prospective students are encouraged to follow an honours or major program in their own discipline and develop some breadth of knowledge during their undergraduate program by selecting from courses in ecology, economics, geography, political science, sociology, and organizational development and behaviour. All students are required to have successfully completed an undergraduate course in economics and statistics prior to admission.

The U.B.C. course recommended to meet the economics requirement is one of the following: Economics 100 or 309; to satisfy the statistics requirements it is suggested that students take either a statistics course in their undergraduate discipline or Statistics 203 and 204.

A candidate who has taken courses equivalent to those described for the Master's degree in addition to prerequisites, may be given credit not to exceed six units for those courses.

Students who do not make satisfactory progress in the program may be asked to withdraw at any time, and the status of all students who have not completed the program within the prescribed two-year period will be reviewed annually thereafter.

About 30 students are admitted annually. We seek highly motivated applicants who can communicate effectively, who are challenged by a field marked by complexity who are creative, and have the potential to provide competent leadership.

Curriculum:

The Master's degree is awarded upon satisfactory completion of a program consisting of 30 units, including a thesis, over two academic years (1.5 units is equivalent to three contact hours per week for one term). Those students who wish to develop a strong specialization may satisfy a significant proportion of this requirement through courses in other departments.

The thesis is valued at up to six units but several regular courses may be used to develop the thesis proposal, research method, and data analysis.

A program of studies will normally be comprised as shown below:

Prerequisites: These cannot be credited toward the Master's degree, and must be completed prior to admission, or in special cases not later than the first year: i) economics, ii) statistics.

Field Camp

All entering students are required to attend a three day field camp prior to the commencement of the fall term, to become acquainted with faculty and fellow students and to examine several typical urban, regional and resource planning problems in B.C.

A: FOUNDATION COURSES

These courses provide a breadth of knowledge covering: the social, economic, and ecological context for urbanization, regional development, and resource planning; the institutional arrangements for planning; and theories of the planning process. Students should enrol in not less than 4.5 units of foundation courses which include, PLAN 500, 501, 502, 503, 504, 505 and 506.

B: METHODS COURSES

Planners have a major responsibility for generating, analyzing and presenting information for the decision-making process. All students require basic skills in planning analysis, and should enrol in not less than 4.5 units of methods courses which include, PLAN 510, 511, 512, 513, 514, 515 and 516. Appropriate courses outside the School may be substituted.

C: SUBSTANTIVE COURSES

These courses provide depth of knowledge within one of the two areas offered by the School. Courses taken in other departments should be complementary and choices should be related to thesis research interests. Students should enrol in not less than 9 units in their area of specialization. Courses in Community Planning include PLAN 520, 521, 522, 523, 524, 525, 526, 536 and those in Regional Development Planning and Natural Resource Planning PLAN 530, 531, 532, 533, 534, 535, 536, 537.

D: WORKSHOPS

These courses provide an opportunity for students to apply their knowledge and skills to planning problems under circumstances that simulate professional practice. Several sections are offered and a student may enrol in more than one project course over the two years, but all first year students should enrol in not less than 1.5 units. The courses include PLAN 540 and 541.

E: THESIS RESEARCH

Students are required to prepare a thesis in their second year on a subject of their choice. The fullest benefit of this research is derived by those students who relate their overall program of studies to their thesis subject area.

Ph.D. Program

Application Procedure

The School offers a Ph.D. program for advanced study and research in the areas of its competence. The Ph.D. is primarily a research degree, so that students should enter with a good background in their field of study. After one year of course work, candidates devote most of their efforts toward thesis research.

Applicants for admission must have a Master's degree in Planning, or its equivalent, with high academic standing.

To ascertain our ability to fulfil potential candidates' objectives, we require a statement of about 1,000 words describing their research interests and objectives which should be submitted with the request for application forms.

Advisory Committees:

A Committee consisting of a prospective research superviser and three other faculty members is established at the time of admission to advise students and approve their program of studies. At least one member of the committee is from a discipline other than Planning. Membership in the committee may change as the student's program evolves, but it is formalized on final approval of the thesis proposal.

Program of Studies:

Each Ph.D. candidate's program is designed by the candidate's advisory committee in consultation with the student to reflect individual requirements.

The program of studies will normally include:

1) course work;
2) qualifying examination;
3) language requirement, at the discretion of the faculty, appropriate to the student's objectives;
4) approval of thesis outline;
5) research and preparation of thesis;
6) oral presentation of thesis and final examination of the candidate.

The first year of the Ph.D. program usually involves course work in preparation for the qualifying examination and development of the research prospectus. Additional courses may be necessary in the second year, in support of the proposed thesis research. Specific requirements are left to the discretion of the candidate's committee in consultation with the candidate.

Ph.D. candidates normally sit their qualifying examination in the second year. It consists of three segments: planning, theory, methods of planning analysis, and the student's area of specialization. Course requirements should be completed by this time.

Students who successfully pass their qualifying exam then finalize their thesis research prospectus in consultation with their advisory committee. After the prospectus has been approved the candidate's efforts are devoted to research and preparation of the thesis.

Students will normally be required to spend a minimum of two winter sessions at the University. Unless, in the opinion of the Executive Committee of the Faculty of Graduate Studies, the delay has been justified by circumstances that are altogether exceptional, those who have not received their degree at the end of six winter sessions will be required to withdraw.

Students are required to register for each session during their studies. Those who fail to register as required may forfeit their candidacy and may be required to reapply.

Dissertation Requirements:

The Executive Committee of the Faculty of Graduate Studies requires the thesis to be submitted to an External Examiner or Examiners approved by the Dean. At the completion of the research the candidate has to take an oral examination in defence of the dissertation as required by the Faculty of Graduate Studies.

Certificate in Site Planning

This certificate program prepares qualified students for specialized professional practice in urban site planning focussing on the residential environment. It is intended for land surveyors, subdivision approving officers, and those qualified in related disciplines.

The admission requirement is a Bachelor's Degree or a two-year technical institute certificate in a related discipline, membership in a related professional association, or secondary school graduation and evidence of substantial experience in site planning or subdivision design.

The certificate is awarded on completion of 9 units of site planning course work with not less than second class standing in each course. The course work is to be completed over not less than two academic years.

The certificate program is offered jointly by the School of Community and Regional Planning and the Centre for Continuing Education. For further information write to Certificate in Site Planning, Centre for Continuing Education, The University of British Columbia, 5997 Iona Drive, Vancouver, B.C. V6T 2A4.

Awards and Financial Assistance

Several awards are open to planning students. Some of these involve a national or University-wide competition. Others are exclusively for students in the School. Research assistantships are also available, generally on completion of the first year of the program, depending on funded research in progress at the time. The School's brochure referred to earlier contains up-to-date information.

THE FACULTY OF DENTISTRY

OFFICE OF THE DEAN

GEORGE S. BEAGRIE, D.D.S. (Edinburgh), D.Sc. (McGill), F.D.S.R.C.S. (Edinburgh and England), F.R.C.D.(C)., F.A.C.D., F.I.C.D., Professor of Oral Medicine and Dean of the Faculty.

DOUGLAS J. YEO, D.D.S. (Toronto), M.P.H. (Michigan), F.I.C.D., F.R.C.D.(C), Professor and Head of Preventive and Community Dentistry; Associate Dean of the Faculty, Undergraduate Student Affairs and Placement.

DAVID DONALDSON, B.D.S. (St. Andrew's), F.D.S., R.C.S. (Edinburgh), M.D.S. (Dundee), Professor and Acting Head of Oral and Maxillofacial Surgery, Professor of Restorative Dentistry, Clinic Director, and Assistant Dean of the Faculty.

ACADEMIC STAFF

Department of Oral Biology

BARRY C. McBRIDE, B.Sc., M.Sc. (Brit. Col.), Ph.D. (Illinois), Professor and Head of the Department.

DONALD M. BRUNETTE, B.Sc., M.Sc., Ph.D. (Toronto), Professor.

ALAN G. HANNAM, B.D.S. (Adelaide), F.D.S., R.C.S. (Eng.), Ph.D. (Bristol), F.R.A.C.D.S., Professor.

LEON KRAINTZ, A.B. (Harvard), M.A., Ph.D. (Rice Inst.), Professor.

JOSEPH TONZETICH, B.S.A. (Brit. Col.), Ph.D. (Cornell), Professor and M.R.C., Career Investigator.

ERNEST PUIL, B.Sc. (Brit. Col.), M.Sc., Ph.D. (Alberta), Associate Professor.

RAVINDRA M. SHAH, B.D.S. (Bombay), M.S. (Buffalo), Ph.D. (Queen's), Associate Professor.

J. DOUGLAS WATERFIELD, B.Sc., M.Sc. (Brit. Col.), Fil.dr. (Karolinska Inst.), Assistant Professor.

S. WAH LEUNG, B.Sc., D.D.S. (McGill), Ph.D. (Rochester), F.A.C.D., F.I.C.D., F.R.C.D.(C), Honorary Professor.

T. KEITH MILTON, D.M.D. (Brit. Col.), Clinical Assistant Professor.

DAVID N. BURDETT, B.Sc., D.M.D. (Brit. Col.), Clinical Lecturer.

ERNST J. SCHMIDT, B.Sc., D.M.D. (Brit. Col.), Clinical Lecturer.

RICHARD H. PEARCE, B.Sc., M.Sc., Ph.D. (Western Ont.), Honorary Professor.

CARL F. CRAMER, B.Sc., M.S. (New Mexico), Ph.D. (Calif.), Honorary Associate Professor.

Department of Oral and Maxillofacial Surgery

DAVID DONALDSON, B.D.S. (St. Andrew's), F.D.S.R.C.S. (Edinburgh), M.D.S. (Dundee), Professor and Acting Head of the Department.

MONTY REITZIK, B.D.S. (Rand), M.B., Ch.B. (Sheffield), F.D.S., R.C.S. (England), Associate Professor.

A. E. SWANSON, D.D.S. (Toronto), M.S. (Michigan), F.R.C.D.(C), Associate Professor.

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WILLIAM S. WALTER, B.A. (Connecticut), D.M.D. (Pittsburgh), Clinical Assistant Professor.

DAVID BARDSLEY, B.Sc. (St. Mary's), M.Sc., D.D.S., (Dalhousie), Sessional Lecturer.

HASKELL T. DAVID, B.A., M.S. (Oregon), D.M.D. (Wash., St. Louis), Sessional Lecturer.

PETER NELSON, B.Sc. (Indiana), D.D.S. (New York), Clinical Assistant Professor.

PERRY H. TRESTER, D.M.D. (Manitoba), Clinical Assistant Professor.

GERALD J. WITTENBERG, D.M.D. (Brit. Col.), M.S. (Minnesota), Sessional Lecturer.

EDWARD Y. M. YEUNG, B.Sc. (Manitoba), D.D.S. (McGill), Sessional Lecturer.

EUGENE MARKS, D.M.D. (Manitoba), Sessional Lecturer.

VIRENDRA K. SETH, B.Sc., B.D.S., D.D.S. (Toronto), M.S. (Chicago), Honorary Sessional Lecturer.

RONALD SLEMKO, D.D.S. (Alta.), Sessional Lecturer.

MARTIN P. BRAVERMAN, D.M.D. (Brit. Col.), Sessional Lecturer.

DEBORAH E. BATTRUM, D.D.S. (Toronto), Sessional Lecturer.

Department of Oral Medicine

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COLIN PRICE, B.D.S. (Birmingham), F.D.S., R.C.S. (Eng.), M.D.S. (Birmingham), F.R.C.D.(C), Professor.

BRUCE BLASBERG, D.M.D. (Pennsylvania), Associate Professor.

TIMOTHY RICHARD LOCKE GOULD, L.D.S., R.C.S. (Eng.), B.D.S. (Lond.), Ph.D. (Toronto), Dip.Periodont, M.R.C.D.(C), Assistant Professor.

JANET L. KARP, B.Sc., D.D.S. (McGill), M.S. (Indiana), Assistant Professor.

ROBERT W. PRIDDY, D.D.S., M.Sc., (Toronto), Assistant Professor.

DOUGLAS A. ANDERSON, D.D.S. (Alberta), M.Sc. (Ohio State), Clinical Assistant Professor.

EDWARD E. CHESKO, B.Ed., B.Sc., D.M.D. (Manitoba), Clinical Lecturer.

G. ALEX DRENNAN, L.D.S., B.D.S. (Toronto), M.Sc. (Washington), F.R.C.D.(C), Clinical Assistant Professor.

CARY GALLER, B.Sc., D.D.S. (McGill), M.S.D. (Wash.), Clinical Lecturer.

WILLA JOSEPHINE GARDNER, Dip.D.H. (Oregon), Clinical Lecturer.

BURTON GOLDSTEIN, B.A. (Brooklyn), D.M.D. (Pennsylvania), M.S. (Illinois), Clinical Associate Professor.

WILLIAM C. HADAWAY, B.Sc., D.M.D. (Brit. Col.), Clinical Assistant Professor.

KATHRYN HORNBY, B.H.E., D.M.D. (Brit. Col.), Clinical Lecturer.

ALLAN HOVAN, D.M.D. (Brit. Col.), Clinical Lecturer.

PETER KEARNEY, D.D.S. (Toronto), Clinical Lecturer.

BRIAN LAHIFFE, B.D.S. (U. Coll. Dublin), Cert. Perio; M.S. (Michigan), F.R.C.D.(C) Clinical Assistant Professor.

JOHN LEE, B.Sc., D.M.D. (Brit. Col.), Clinical Lecturer.

ROBERT LEUNG, D.M.D. (Brit. Col.), M.P.H. (Loma Linda), Dip. Perio. (Brit. Col.), Clinical Lecturer.

W. BRIAN MARYK, B.Sc., M.Sc., D.M.D. (Manitoba), Clinical Assistant Professor.

T. KEITH MILTON, D.M.D. (Brit. Col.), Clinical Lecturer.

PETER MUNNS, B.D.S. (London), M.Sc.D. (Boston), Clinical Assistant Professor.

MARK NORRIS, D.M.D. (Brit. Col.) Clinical Lecturer.

JANET ROBERTS, B.Sc., D.M.D. (Brit. Col.), Clinical Lecturer.

GALE D. ROCKY, Dip.D.H., D.M.D. Brit. Col.), Clinical Lecturer.

CAROL A. SHPAK, D.D.S. (Washington), Clinical Lecturer.

MICHAEL J. A. SMITH, B.D.S. (Manchester), F.D.S., R.C.P.S. (Glasgow), Clinical Associate Professor.

KATRIN TURU, B.Sc. (Toronto), D.D.S. (Toronto), Clinical Lecturer.

CURTIS WADE, D.D.S. (Oklahoma), Cert. Perio. (Washington), Clinical Lecturer.

DAVID WATERMAN, D.M.D. (Brit. Col.), Clinical Lecturer.

LEON WOOLF, B.D.S. (London), L.D.S., R.C.S. (England), Clinical Assistant Professor.

HARRY M. WORTH, L.D.S., R.C.S. (England), M.R.C.S. (England), L.R.C.P. (London), D.M.R.E. (Cantab.), F.R.C.R., F.R.C.P.(C), Hon.F.R.C.D.(C), LL.D. (Toronto), Hon.F.D.S., R.C.S. (England), Honorary Professor.

ANDREW CHALMERS, B.Sc. Med. (Cape Town), M.D. (Brit. Col.), Honorary Associate Professor.

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Department of Orthodontics

ALAN A. LOWE, D.M.D. (Brit. Col.), Dip.Ortho., Ph.D. (Toronto), F.R.C.D.(C), Professor and Head of the Department.

CLEMENT S. C. LEAR, B.D.S. (New Zealand), Dip. Ortho., D.M.D. (Harvard), Professor.

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Department of Preventive and Community Dentistry

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H. JACK HANN, D.D.S. (Dalhousie), M.P.H. (Michigan), F.R.C.D.(C), Associate Professor (part-time).
CLAUDIA L. ANDERSON, Dip.D.H. (Manitoba), Sessional Lecturer.
BRIAN N. ROCKY, B.Sc., D.M.D. (Brit. Col.), Clinical Sessional Lecturer.
ALAN S. GRAY, D.D.S. (Alberta), D.D.P.H. (Toronto) F.R.C.D.(C), Honorary Lecturer.
ELIZABETH A. LINDSAY, Dip.D.H. (Brit. Col.), Honorary Lecturer.
ROBERT J. ORR, LL.B. (Brit. Col.), Honorary Lecturer.
MARY ANNE REILANDER, B.H.E. (Brit. Col.), Honorary Lecturer.
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Department of Restorative Dentistry

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DAVID DONALDSON, B.D.S. (St. Andrew's), F.D.S., R.C.S. (Edinburgh), M.D.S. (Dundee), Professor.
PIERRE R. DOW, B.A.Sc. (Washington), D.D.S. (Washington), M.Sc. (Brit. Col.), Professor
TREVOR J. HARROP, L.D.S. (Glasgow), D.D.S. (Dalhousie), M.S., Ph.D. (Iowa), Professor.
ALAN S. RICHARDSON, D.D.S., M.Sc. (Alberta), Professor.
WILLIAM A. RICHTER, D.M.D., M.S. (Oregon), Professor.
RICHARD H. ROYDHOUSE, B.D.S. (New Zealand), M.S. (Rochester), D.D.Sc. (Otago), Professor.
MARCIA ANN BOYD, D.D.S. (Alberta), M.A. (Brit. Col.), Associate Professor.
GARY D. DERKSON, D.M.D. (Manitoba), Associate Professor.
MICHAEL I. MacENTEE, L.D.S. (R.C.S.I.), Dip. Prosth. (S. Carolina), F.R.C.D.(C), Associate Professor.
WILLIAM W. WOOD, B.D.Sc. (Melbourne), D.D.S. (Toronto), M.A. (Brit. Col.), F.R.C.D.(C), Associate Professor.
GARY B. GIBSON, D.D.S. (Alberta), Assistant Professor.
S. L. KHANNA, B.A., B.D.S. (Punjab), D.M.D. (Manitoba), M.S. (Rochester), Assistant Professor.
LANCE M. RUCKER, B.A. (Calif., Berkeley), B.S., D.D.S. (Calif., San Francisco), Assistant Professor.
RONALD J. SHUPE, D.D.S. (Alberta), Cert. Fixed, Removable M.F. Prosth (Louisiana State), M.A. (New Orleans), Res. M.F. Prosth (Texas), Assistant Professor (part-time).
NORMAN C. FERGUSON, D.M.D. (Oregon), F.R.C.D.(C), Clinical Associate Professor.
MICHAEL BALANKO, D.M.D. (Oregon), Clinical Assistant Professor.
FRANK P. BERGER, D.M.D. (Brit. Col.), Clinical Assistant Professor.
PETER J. BRUTTON, B.D.S. (Liverpool), Clinical Assistant Professor.
JOHN S. DIGGENS, D.M.D. (Brit. Col.), F.R.C.D.(C), Clinical Assistant Professor.
JAMES FINDLAY, D.M.D. (Brit. Col.), Clinical Assistant Professor.
JOHN G. FRASER, B.D.S., M.D.S. (Otago), F.R.C.D.(C), Clinical Assistant Professor.
CLAUDE W. GARDNER, D.M.D. (Oregon), Clinical Assistant Professor.
MURRAY GOOD, D.M.D. (Manitoba), Clinical Assistant Professor.
RAY GREENFELD, D.M.D. (Manitoba), Cert. Endo. (Oregon), Clinical Assistant Professor.
MARK W. HODGE, B.Sc., D.M.D. (Kentucky), Cert. Endo. (Virginia), Clinical Assistant Professor.
EDWARD J. HYDE, B.Sc. (Sir George Williams), D.D.S. (McGill), M.S.D. (Indiana), Clinical Assistant Professor.
GORDON M. JINKS, D.D.S. (Toronto), Clinical Assistant Professor.
CARELL KEATH, B.H.E., D.M.D. (Brit. Col.), Clinical Assistant Professor.
TERRENCE S. KLINE, B.Sc., D.D.S. (Alberta), Clinical Assistant Professor.
MALVIN PANAR, D.D.S. (Minn.), Clinical Assistant Professor.
ROBERT E. PATTON, D.D.S. (McGill), Clinical Assistant Professor.
JOHN W. RICHMOND, B.A. (Brit. Col.), D.D.S. (Alberta), Clinical Assistant Professor.
KENJI K. SHIMIZU, D.M.D. (Brit. Col.), Clinical Assistant Professor.
SHARMA K. SINANAN, B.A. (Brit. Col.), D.M.D. (Brit. Col.), Cert. Endo. (Oregon), F.R.C.D.(C), Clinical Assistant Professor.
ROBERT B. TELFORD, D.M.D. (Oregon), Clinical Assistant Professor.
W. C. FRED WEINSTEIN, D.M.D. (Manitoba), Clinical Assistant Professor.
DON. C. ALDERSON, D.D.S. (Alberta), Clinical Lecturer.
JAMES P. ARMSTRONG, D.M.D. (Brit. Col.), Clinical Lecturer.
DEBORAH BATTRUM, B.Sc., D.D.S. (Toronto), Clinical Lecturer.
BARBARA BRADEY, D.D.S. (Alberta), Clinical Lecturer.
WAYNE A. CHOU, D.M.D. (Brit. Col.), Clinical Lecturer.
CHRISTINE COLLISON, B.S. (Towson), M.A.S. (Johns Hopkins), D.D.S. (Maryland), Clinical Lecturer.
MICHAEL FUNG, D.M.D. (Brit. Col.), Clinical Lecturer.
IRENE I. GLASGOW, D.D.D. (Lithuania), D.D.S. (Alberta), Clinical Lecturer.
TAT WAI HUNG, B.Sc. (Wisconsin), D.M.D. (Missouri-St. Louis), Clinical Lecturer.
RONALD A. KLEINKNECHT, B.A., M.A., Ph.D. (Washington), Clinical Lecturer.
CATHRYN E. McGREGOR, H.B.Sc., D.M.D. (Brit. Col.), Clinical Lecturer.
LEE PULOS, B.A. (Calif., Los Angeles), M.A. (Long Beach), Ph.D. (Denver), Clinical Lecturer.
JOY M. RICHMAN, D.M.D. (Man.), M.S.D. (Connecticut), Cert. Pedo (Connecticut), Clinical Lecturer.
E. RICARDO SCHWEDHELM, D.C.D. (Mexico), M.Sc. (Indiana), Clinical Lecturer.
MARNIE E. SHKWAROK, B.Sc., D.M.D. (Brit. Col.), Clinical Lecturer.
DAVID SWEET, B.Sc., D.M.D. (Brit. Col.), Clinical Lecturer.
BASKER N. THAKORE, B.Sc., D.M.D. (Brit. Col.), Clinical Lecturer.
RONALD A. VIRTUE, D.D.S. (St. Louis, Miss.), Clinical Sessional Lecturer.
DENISE E. WIGGINS, B.Sc. (Concordia), D.D.S. (McGill), Clinical Lecturer.
RALPH I. YORSH, B.A. (Saskatchewan), D.D.S. (Toronto), Clinical Lecturer.
ALEXANDER J. YULE, B.D.S., M.D.S. (Sydney), Clinical Lecturer.
RONALD J. ZOKOL, D.M.D. (Brit. Col.), Clinical Lecturer.
LUDLOW W. BEAMISH, B.A. (Brit. Col.), D.M.D. (Oregon, North Pacific), F.R.C.D.(C), Honorary Clinical Assistant Professor.
RICHARD B. ABRAMS, D.D.S. (West Virginia), Honorary Clinical Lecturer.
M. ARNOLD ABRAMSON, B.Sc. (Calgary), D.D.S. (Toronto), Honorary Clinical Lecturer.
THERESA CHIANG, B.Sc., D.D.S. (Dalhousie), M.Sc. (Harvard), Honorary Clinical Lecturer.
HARRY L. GELFANT, D.D.S. (Toronto), Honorary Clinical Lecturer.
JAMES E. G. HARRISON, D.D.S. (McGill), Honorary Clinicial Lecturer.
DAVID B. KENNEDY, B.D.S. (London), L.D.S., R.C.S. (England), M.S.D. (Indiana), Cert. Ortho. (Washington), Honorary Clinical Lecturer.
RICHARD B. KRAMER, D.D.S. (McGill), M.Sc.D. (Boston), Honorary Clinical Lecturer.
JOHN H. McNEILL, B.Sc., M.Sc. (Alta.), Ph.D. (Mich.), Honorary Clinical Lecturer.
DAVID J. MORAN, D.D.S. (Toronto), Honorary Clinical Lecturer.
DENNIS P. A. NIMCHUK, D.D.S. (Toronto), Honorary Clinical Lecturer.
PETER STEVENSON-MOORE, B.D.S. (London), L.D.S., R.C.S. (Eng.), M.S.D. (Washington), Honorary Clinical Lecturer.

Division of Continuing Dental Education

MALCOLM F. WILLIAMSON, B.D.S. (London), L.D.S., R.C.S. (England), D.D.P.H. (Toronto), Director, Continuing Dental Education; Associate Professor, Preventive and Community Dentistry.
JANE M. WONG, Dip.D.H. (Dalhousie), B.A. (Brit. Col.), Assistant Director.

Departments of Anatomy, Pathology, Pharmacology and Therapeutics, and Physiology—

See Faculty of Medicine.

Lecturers from Other Departments
F. R. C. JOHNSTONE, Professor of Surgery.
B. C. McGILLIVRAY, Assistant Professor of Medical Genetics.
K. W. TURNBULL, Clinical Assistant Professor of Anaesthesiology.

FACULTY OF DENTISTRY

The Faculty of Dentistry was established in 1962 as the result of two detailed surveys of the need for dental education facilities in the Province of British Columbia, conducted in 1955 and 1961 by Dr. John B. Macdonald. The Dean of the new Faculty was appointed in July, 1962, and a small class of undergraduate dental students was admitted in September, 1964. For three years instruction and administration were carried out in temporary facilities but, in July, 1967, the Faculty moved into the new and modern John Barfoot Macdonald Building (Dental Health Sciences).

The teaching facilities have been designed as part of a developing Health Sciences Centre to promote integrated teaching of a health services team. Instruction in the basic health sciences is provided by the appropriate basic science departments, under the joint administration of the Faculty of Medicine and Faculty of Dentistry. Dental and medical students receive instruction together. Library facilities are provided in the Woodward Biomedical Library.

The teaching of preclinical dental sciences and clinical dentistry is carried out in modern facilities in the Macdonald Building. These have been designed to reflect the newest concepts in educational methodology and the provision of patient care. Closed-circuit television and extensive research facilities have been incorporated into the building. Continuing education and graduate and postgraduate programs are also provided.

Objectives

The Doctor of Dental Medicine degree program is designed to prepare students to practise their chosen profession with a high degree of technical skill based on a sound knowledge of the related biological sciences, and to make them aware of the interaction of the dentist as a health professional in the community.

Admission Requirements

Admission to the Faculty of Dentistry is based primarily on academic ability, place of residence, and personal qualities as evidenced by predental scholastic records, aptitude tests, letters of recommendation, and personal interviews. Since facilities for pre-clinical and clinical instruction are limited, enrolment must, of necessity, be restricted.

The fulfilment of the minimum requirements for admission does not guarantee acceptance.

Application forms and information regarding predental requirements, tuition and fees may be obtained from the Office of the Dean, Faculty of Dentistry, 350-2194 Health Sciences Mall, The University of British Columbia, Vancouver, B.C., V6T 1W5. The deadline for applications each year is December 31 for admission the following September and the earliest date for applying is July 1 of the previous year.

Predental Requirements

The requirements listed below apply to the student taking predental work in the Faculty of Arts or the Faculty of Science at The University of British Columbia. An applicant from another university must submit evidence of having successfully completed equivalent prerequisite courses:

1. English 100 (Literature and Composition)
2. Mathematics 100 (Calculus I) and Mathematics 101 (Calculus II)

OR Mathematics 111 (Elementary Calculus)*
OR Mathematics 130 (Finite Mathematics)

* Students should be aware that Mathematics 111 may be insufficient for concurrent registration in some first-year Physics and Chemistry courses.

3. Chemistry 103 (General Chemistry)

OR Chemistry 110 or 120 (Principles of Chemistry)

4. Chemistry 203 or 230 (Organic Chemistry)
5. Biochemistry 300 (Principles of Biochemistry)

OR Biology 201 (Cell Biology II) *and* Biochemistry 302 or 303

6. Physics 110 (Mechanics, Electricity and Atomic Structure)

OR Physics 115 (Wave Motion, Mechanics and Electricity)
OR Physics 120 (Wave Motion, Mechanics and Electromagnetism)

7. Biology 101 or 102 (Principles of Biology).

The student should select other courses to conform with the requirements for a baccalaureate degree. It is strongly recommended that there be a fair representation of courses in the Humanities and Social Sciences in the student's program of study.

Candidates for admission to the Faculty of Dentistry should have completed the equivalent of three academic years in the Faculty of Arts or Faculty of Science at the University of British Columbia. A minimal scholastic average of 65% or Second Class standing, based upon the system of grading used at The University of British Columbia, is required.

Aptitude Testing

Prospective applicants should take the Canadian Dental Association Dental Aptitude Test (or the American Dental Association Aptitude Test). Information and application forms are available from the Student Counselling and Resources Centre, U.B.C.; or the Office of the Dean, Faculty of Dentistry; or Dental Aptitude Test Program, Canadian Dental Association, 1815 Alta Vista Drive, Ottawa, Ontario K1G 3Y6. Inquiries concerning the American Dental Association test should be addressed to the Division of Educational Measurements, Council on Dental Education, American Dental Association, 211 East Chicago Avenue, Chicago, Illinois 60611. At the time of the test the student should request that the scores be sent to Undergraduate Admissions, Office of the Dean, Faculty of Dentistry, 350-2194 Health Sciences Mall, The University of British Columbia, Vancouver, B.C. V6T 1W5.

Deposit

The successful applicant is required to submit a deposit of $100 within two weeks of notification of acceptance by the University. This deposit is non-refundable and shall be applied towards the tuition of the first term of the session for which the student has been accepted.

Combined B.Sc. degree and D.M.D. degree program

Students who have completed the third year in one of the approved degree programs of the Faculty of Science at U.B.C. and the first two years in the Faculty of Dentistry at U.B.C., and who have completed ALL the course requirements of the degree program may be eligible for the appropriate B.Sc. degree. It is necessary that such students meet all the specific course requirements of the departmental degree program and have the approval of the Head of the Department prior to entry into the Faculty of Dentistry. Students should plan to meet these specific course requirements while in the Faculty of Science. With the approval of the Dean of Science, up to 15 units of course work in the Faculty of Dentistry may be recognized for credit towards the B.Sc. degree.

Students in the Faculty of Dentistry who wish to qualify for the B.Sc. degree must file a copy of their program in first and second year Dentistry with the Dean of Science by September 15 of the Winter Session of the year preceding the Fall in which they plan to qualify for the B.Sc. Degree.

Admission of Students to Advanced Standing

A. Students from an accredited Canadian or American dental school seeking transfer to this Faculty

1. Students who have been required to withdraw from any other dental school for academic or other reasons are not eligible for admission.
2. Students who have successfully completed one or more years at an accredited dental school and seek admission,
   (a) must fulfil the predental admission requirements of this University,
   (b) must have successfully completed courses equivalent to those offered in this Faculty for the years below that into which transfer is being sought,
   (c) may be required to pass special placement or other examinations set by this Faculty,
   (d) may be required to repeat the year most recently completed at the former institution,
   (e) shall not be eligible for admission into the fourth year.
   (f) must submit a $25 application fee to cover the costs of evaluating educational documents from outside the Province of British Columbia.

B. Students who have obtained their dental degree from a foreign country and wish to obtain a Canadian degree in order to practise in Canada

Foreign dentists may seek admission to our dental school in the second year of a four-year program. Applicants

(a) must submit a complete record of their entire education from high school or pre-university study to the end of university studies. Evidence of graduation must be submitted as well as official transcripts of the applicant's marks for this period.
(b) must possess a good working knowledge of the English language.
(c) will be required to present results from either of the following examinations:
   (i) National Dental Examining Board of Canada comprehensive examination (written section). Candidates will be required to attain "pass" standing on this examination. Information and application materials may be obtained from the National Dental Examining Board of Canada, 807 - 100 Bronson Avenue, Ottawa, Ontario K1R 6G8.

OR (ii) Part I of the U.S. National Dental Board examinations. Candidates will be required to attain a score of at least 85 on this examination. Details of the examination and an application will be mailed to the applicant following submission of application to this dental school.

(d) must submit a $25 application fee to cover the costs of evaluation of educational documents.

(e) must make application by February 15 for the year to which admission is sought.

Compliance with the above rules will not guarantee a place in this dental school. An applicant with advanced placement can only be admitted if a place is vacated by an existing student. We receive many more applications than we can accept.

C. Beyond the first four weeks of first term in any academic year, no vacancies caused by student withdrawal in any class will be filled, except in extraordinary circumstances.

Registration

The academic year of the Faculty of Dentistry usually begins on the Tuesday after Labour Day. Candidates who have been accepted for admission to the Faculty of Dentistry will be notified by mail of the time and place of registration. Failure to complete registration on the designated day will render the student liable for a late registration fee. No student will be allowed to register after the first day of instruction in the term, or be admitted to any class after its first meeting, except by permission of the Dean.

An accepted applicant may be required to submit a health record to the University Health Service at the time of acceptance. The approved form will be included in the registration package. Any false or inaccurate statement concerning health could jeopardize the applicant's status as a student.

Attendance

1. Regular attendance is expected of students in all their classes (including lectures, laboratories, tutorials, seminars, etc). Students who neglect their academic work and assignments may be excluded from the final examinations. Students who are unavoidably absent because of illness or disability should report to their instructors on return to classes.
2. Students, who because of illness are absent from a December or April examination, must submit a physician's certificate to the University Health Service as promptly as possible.
3. Unavoidable absence of one day or less for reasons other than sickness must be explained to the instructor or instructors concerned when the student returns to classes. If the absence is for longer than one day, arrangement for readmission must be made through the Dean's office.
4. A student *planning* to be absent from classes for any reason must obtain prior permission from the Dean's office.

Examinations

1. Examinations in the Faculty of Dentistry may be held at various times throughout the year. These examinations are obligatory for all students.
2. Should students find that they will be unavoidably absent from a sessional examination, they, or someone familiar with the situation, must notify the Dean's office of the facts in the case before the end of the period during which the examination is scheduled. Non-observance of this rule may result in failure being recorded in the course.
3. When a sessional examination has been missed through illness or some other justifiable cause, application for deferred examination or special consideration must be made in writing to the Dean as soon as possible after the close of the examination period. If the absence was for reasons of health, a physician's certificate indicating the nature and duration of the illness must be submitted to the University Health Service.
4. Students may be denied the privilege of writing a sessional examination in any subject because of unsatisfactory work or attendance, and in this case they will be considered to have failed in the course.
5. In any course which involves both laboratory work and/or clinical and written examinations, a student is required to make satisfactory standing in each part. If the course is repeated, no exemption will ordinarily be granted from the work in any part.
6. Term essays and examination papers may be refused a passing mark if they are illegible or noticeably deficient in English.
7. The passing mark in the Faculty of Dentistry is 60%. Examinations will be graded as follows: First Class, 80% or over; Second Class, 65%; Pass, 60%.
8. All results of final examinations will be passed by the Promotions Committee and approved by Senate. Release will be made by the Registrar. Final examination results will not be communicated through any other channel.

Advancement

1. The Faculty will determine the student's fitness for promotion at the end of each session. No student with defective standing will be promoted.
2. A student whose academic standing is unsatisfactory may be required either to withdraw from the Faculty or to repeat the entire work of the year.
3. If the progress of a student has been unsatisfactory in any given session, the Faculty may permit a supplemental examination in the subject(s) failed provided an average of at least 60% in the work of the year, including the failed courses, has been attained.

The department or departments concerned may direct such work as will be necessary to prepare for the supplemental examination. It is the responsibility of the student to consult the heads of the departments concerned about such arrangements. A student who satisfies the requirements of the departments concerned and passes each supplemental examination with a mark of at least 65% will be promoted. All supplemental examinations must be taken at the University.

4. A student in the First Year who fails to be promoted will not be permitted to repeat the year except under special circumstances.
5. A student in any year taking a full program of studies who does not pass in at least sixty per cent of it will be required to withdraw from the University for at least a year.
6. Although satisfactory academic performance is prerequisite to advancement, it is not the sole criterion in consideration of the suitability of a student for promotion or graduation. The Faculty reserves the right to require a student to withdraw from the Faculty if considered to be unsuited to proceed with the study or enter the practice of dentistry.

Instruments and Supplies

Information regarding textbooks will be given by the instructor in each course. Not less than $600 per year should be available for purchasing textbooks and expendable supplies.

The following instruments and supplies will be required during the four years of instruction. It is recommended that no purchases be made until details are furnished by the departments concerned. Amounts quoted are subject to change without notice.

	Approximate Price	
Cardiopulmonary Resuscitation Certificate course	$ 15.00	
Anatomy Laboratory Fee (First Year)	$ 30.00	
Instruments for anatomy and physiology	$ 35.00	
Laboratory coats	$ 100.00	
Microscope — an approved model (first year only)	$ 750.00	
Dental Instruments—First Year	$1,483	(Purchase and Lease)
—Second Year	$1,805.00	(Purchase and lease)
—Third Year	$1,000	(Purchase and lease)
—Fourth Year	$ 50.00	(Purchase and lease)
Course handouts	$ 75.00	Maximum

Graduation (Requirements for the degree of D.M.D.)

1. A candidate for the D.M.D. degree must have fulfilled all the requirements for entrance to the Faculty of Dentistry and have attended the courses of instruction which comprise the dental curriculum. No one will be admitted to candidacy for the D.M.D. degree who has not been in attendance for at least two years at the University of British Columbia, the final year of which must be in the Faculty of Dentistry.
2. Each candidate for graduation must have passed all examinations in subjects comprising the dental course or must have received satisfactory standing in courses where specific marks are not assigned.
3. The Faculty will recommend to Senate the granting of the D.M.D. degree to a student who has completed satisfactorily the academic requirements and who, in addition, is recommended by the Faculty to be a suitable person to practise Dentistry.
4. Every candidate for a D.M.D. degree must make formal application for graduation. Application for graduation must be made not later than March 15. Special forms for this purpose are provided by the Registrar's office.

Regulations Regarding Licence to Practise Dentistry

The possession of a D.M.D. degree does not automatically confer the right to practise dentistry in any province in Canada. Each province has a licensing body which grants a licence to practise dentistry within its own borders. Inquiries concerning registration and licensing should be directed to the Registrar, College of Dental Surgeons of B.C., 1125 West 8th Avenue, Vancouver, B.C., V6H 3N4 or to his counterpart in other provinces. Most provinces will accept for registration the certificate issued by the National Dental Examining Board. Information concerning National Dental Examining Board certificates may be obtained from The Secretary-Treasurer, National Dental Examining Board, 203-100 Bronson Street, Ottawa, Ontario, K1R 6G8.

Courses of Instruction

First Year:

Anatomy 400, 401; Pathology 401; Physiology 400; Oral Biology 410, 411, 412; Microbiology 415; Preventive and Community Dentistry 410; and Restorative Dentistry 410.

Second Year:

Anatomy 425; Physiology 425; Microbiology 425; Pharmacology 425; Oral Biology 420; Oral Medicine 420, 421, 422, 423, 424; Oral and Maxillofacial Surgery 420; Orthodontics 420; Preventive and Community Dentistry 420; Restorative Dentistry 420, 421, 422, 423.

Third Year:

Oral Biology 430; Oral Medicine 430, 431, 432, 433; Oral and Maxillofacial Surgery 430; Orthodontics 430; Preventive and Community Dentistry 430; Restorative Dentistry 430, 431, 432, 433, 434.

Fourth Year:

Dentistry 440; Oral Biology 440; Oral Medicine 440, 441, 442; Oral and Maxillofacial Surgery 440; Orthodontics 440; Preventive and Community Dentistry 440; Restorative Dentistry 440, 441, 442, 443.

POST-GRADUATE SPECIALTY TRAINING PROGRAM IN PERIODONTICS

The Department of Oral Medicine offers post-graduate training in periodontics in conjunction with the M.Sc. (Dental Science) as a three year program. Successful graduates will receive a Diploma in Periodontics as well as the Master of Science degree in Dental Science (M.Sc. Dental Science). The program will provide education and training for potential research workers and specialist teachers in periodontology.

Admission to the combined program is subject to evidence of a capacity for graduate study and applicants must satisfy the requirements for admission to the Faculty of Graduate Studies. Applicants must hold a D.M.D. degree or its equivalent from a recognized university. Registration in the course is dependent upon the availability of adequate Faculty and facilities.

Consent of the Department is required prior to registration.

Graduates will be eligible to take the examinations for specialty certification in Periodontics of the National Dental Examining Board of Canada and the American Board of Periodontology. They will also be in a position to sit the Fellowship examination of the Royal College of Dentists of Canada.

Students may also be admitted to a two-year Diploma program for specialty training in Periodontics. Conditions for admission to this course of studies are the same as those for the combined program.

Deposit

Students accepting an offer of admission to the combined M.Sc. and Diploma program, or the Diploma program alone, at the time of acceptance of admission are required to pay a non-refundable deposit of $500.00 to be applied towards the student's first-term tuition.

Ph.D. IN ORAL BIOLOGY

See Faculty of Graduate Studies.

M.Sc. IN DENTAL SCIENCE

See Faculty of Graduate Studies.

GENERAL PRACTICE RESIDENCY PROGRAM

The Departments of Dentistry of the U.B.C. Health Sciences Centre Hospital, Vancouver General Hospital, and the Cancer Control Agency of British Columbia, offer a one year General Practice Residency training program commencing June 15th each year, except for one position which begins July 1st. The five residents selected must be registered as students in the Division of Graduate/Postgraduate Studies of the Faculty of Dentistry and with the College of Dental Surgeons of British Columbia for which separate fees are paid.

Admission Requirements

Candidates must be graduates of an accredited dental school in Canada or the United States and must satisfy the requirements for registration of the College of Dental Surgeons of B.C. Applicants from other countries must have the Canadian National Dental Examining Board Certificate.

Application

Application forms and descriptive literature may be obtained from the Director, Division of Graduate/Postgraduate Studies, Faculty of Dentistry, The University of British Columbia, 2199 Wesbrook Mall, Vancouver, B.C., V6T 1Z7, Canada. Enquiries may also be made of the Heads of Dental Departments of the individual teaching hospitals. The completed application must be submitted before September 1st for entry to the program commencing June 15th the following year.

1986/87

THE FACULTY OF EDUCATION

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JANE GASKELL, B.A. (Swarthmore), Ed.D. (Harvard), Associate Professor.
RONALD G. JONES, M.A. (Virginia), Ed.D., Ph.D. (State U. of New York), Professor.
JOHN W. KEHOE, B.A., B.Ed. (Sask.), M.A., Ph.D. (Toronto), Professor.
MARVIN LAZERSON, M.A. (Columbia), Ph.D. (Harvard), Professor.
DENNIS MILBURN, M.Sc., M.Phil., Ph.D. (London), Professor.
NEIL SUTHERLAND, M.A. (Brit. Col.), Ph.D. (Minnesota), Professor.
CHARLES UNGERLEIDER, B.A. (San Francisco), M.A. (Columbia), Ed.D. (Massachusetts), Associate Professor.
WALTER WERNER, M.Ed. (Calgary), Ph.D. (Alta.), Associate Professor.
DONALD C. WILSON, M.A. (Brit. Col.), Ph.D. (Alta.), Associate Professor.
J. DONALD WILSON, B.A. (Western Ontario), M.A. (Toronto), Ph.D. (Western Ontario), Professor.
IAN WRIGHT, M.Ed. (Calgary), Ph.D. (Alta.), Associate Professor.

Department of Visual and Performing Arts in Education

RONALD MacGREGOR, B.Ed. (Brit. Col.), M.Ed. (Alta.), Ph.D. (Oregon), Professor and Head.
JEANETTE L. ANDREWS, B.Ed., M.A. (Brit. Col.), Instructor.
F. GRAEME CHALMERS, Dip. Fine Arts (Auckland), M.A. (Indiana), Ph.D. (Oregon), Professor.
ALLEN E. CLINGMAN, M.M.E. (Drake), M.A., Prof. Dip. in Music and Music Ed., Ed.D. (Columbia), Professor.
SANDRA J. DAVIES, M.S. (Illinois), Assistant Professor.
GLEN T. DIXON, B.M.E. (Massachusetts State Coll.), M.Ed. (Tufts), Ed.D. (Georgia), Assistant Professor.
MICHAEL I. FOSTER, B.Ed. (Brit. Col.), M.A. (Washington), Professor.
THEO GOLDBERG, M.A. (Western Washington), D.M. (Toronto), Professor.
JAMES U. GRAY, Dip. (Vancouver School of Art), B.Ed. (Brit. Col.), M.Ed. (Western Washington), Ph.D. (Washington), Professor.
DORIS LIVINGSTONE, B.A., B.Ed. (Alta.), M.Ed. (Brit. Col.), Assistant Professor.

ALEX McLEOD, M.Ed. (Brit. Col.), Senior Instructor.
JOHN S. MURRAY, B.A. (Brit. Col.), M.Mus., D.Ed. (Oregon), Associate Professor.
ROSALIE STALEY, B.A., M.S. (Vanderbilt), M.A. (Wilkes College), Ph.D. (Pennsylvania State), Associate Professor.
ROBERT STEELE, B.A., B.Ed. (Sask.), Associate Professor.
G. CAMPBELL TROWSDALE, B.Mus., B.Ed., M.Ed., D.Ed. (Toronto), A.R.C.T., Professor.
JEAN M. WEAKLAND, B.S. (Colorado State University), M.A. (Colorado State College), M.F.A. (Indiana), Associate Professor.

Centre for the Study of Curriculum and Instruction:
LEROI B. DANIELS, M.A. (Brit. Col.), Ph.D. (Illinois), Professor and Director.

Centre for the Study of Teacher Education:
IAN E. HOUSEGO, B.A., B.Ed. (Sask.), M.Ed., Ph.D. (Alta.), Professor and Director.

Centre for Policy Studies:
LAWRENCE W. DOWNEY, B.A. (Sask.), B.A. (Brit. Col.), Ph.D. (Chicago), Professor and Director.

Non-Departmental Personnel
JACKIE AGOSTINIS, B.A. (Victoria), Lecturer (Native Indian Teacher Education Program).
LAVERNE ADAMS, B.Ed. (Brit. Col.), Lecturer (Native Indian Teacher Education Program).
JO-ANN ARCHIBALD, B.Ed. (Brit. Col.), M.A. (Simon Fraser), Lecturer (Native Indian Teacher Education Program).
VALLORY FRIESEN, B.A. (Brit. Col.), Lecturer (Native Indian Teacher Education Program).
KAREN S. JOHNSON, B.Ed. (Brit. Col.), Lecturer (Native Indian Teacher Education Program).
VERNA KIRKNESS, B.A., B.Ed., M.Ed. (Manit.), Assistant Professor and Director, Native Indian Education.
LORNA MacDONALD, B.Ed. (Brit. Col.), Lecturer (Native Indian Teacher Education Program).
SHEILA TEHENNEPE, B.Ed. (Simon Fraser), Lecturer (Native Indian Teacher Education Program).

I. ACADEMIC OFFERINGS IN THE FACULTY OF EDUCATION

A. Study Programs in Teacher Education

1. Undergraduate Degree Programs

The Bachelor of Education (Elementary) is a four-year preparation beyond graduation from secondary school. In this program the student develops either an academic concentration and a professional concentration, or a professional major.

The Bachelor of Education (Secondary) is a five-year preparation with either two academic concentrations which form part of the secondary school curriculum, or a major or honours in one subject related to the secondary school curriculum.

The Bachelor of Education in Special Education is a five-year program which provides a specialized preparation for teachers who wish to enter the school system as resource personnel to assist in the specific needs of special education.

Generally a student can enter the Faculty in Year One from secondary school or Year Two or Three from a regional college or another university or another faculty at this institution. Those choosing art, music, mathematics, science or language, all requiring sequential courses, should commence their work outside this institution only if equivalent initial course work is available through the institution chosen. Enquiries on the point should be directed to the Teacher Education Office in the Faculty.

2. Post-degree Programs

The Faculty of Education offers a variety of programs to those who have completed an undergraduate degree preparation acceptable to the Faculty. Direct enquiries to the Teacher Education Office.

3. The Diploma in Education

The diploma program provides opportunity for teachers and others working in instructional settings to undertake a structured sequence of courses. See Section VI for details of the fields of specialization in which the Diploma is available.

B. Other Study Programs

The Instructor's Diploma Program is offered jointly by the Faculty and by the Centre for Continuing Education. Programs are available to those who are chosen to instruct in the vocational schools of the province. Information concerning the program can be obtained from the Director, Instructor's Diploma Program, Centre for Continuing Education, 5997 Iona Drive, U.B.C., Vancouver, B.C. V6T 2A4.

C. Graduate Programs.

See the latter part of the Education section, and also the Faculty of Graduate Studies section of the Calendar.

II. INFORMATION ON TEACHER EDUCATION PROGRAMS

A. Admission

1. Applicants for admission to the Faculty must meet the general requirements of the University and certain additional requirements as specified below. Not all fully-qualified applicants will be accepted if the number of applicants exceeds the number provided for in each year or program of study. Enrolment must, of necessity, be restricted to those who, in the judgement of the Faculty, are best qualified to meet the mental and physical demands of the curriculum, and most likely to be able to complete successfully the full course of study. Applicants who fail to meet the minimum required standards in the Speech Clearance test or the Written English test will automatically be rejected.

All applicants must submit a statement of relevant experience on the appropriate form provided by the Registrar.

For selection of candidates for admission as transfer students at the third year level or later in B.Ed. (Elementary, Secondary and Special Education) degree programs, an average of at least 65% or equivalent is required on the best 24 units of course work (including English 100) prescribed for the first two years.

For selection of candidates who are graduates of other Faculties, see under #3, following.

In the selection of all candidates for admission academic factors are predominant. Non-academic factors that may influence admission are maturity, experience and indications of suitability for teaching as revealed by writing and speaking ability and by expressed motivation and interest in a teaching career. Selection of candidates for admission is made by majority vote of an Admissions Committee which represents both professional and academic interests of the Faculty. An interview may be required.

All applications must be received not later than May 31 and all supporting documents by June 15.

Note:

The Faculty of Education is proposing to revise its undergraduate degree programs. Interested persons should consult the Faculty for information about the potential revision of admission and program requirements.

In anticipation of this revision, no students will be admitted in 1986 to the first year of on-campus programs of the B.Ed. Students should seek initial admission to other degree programs and select courses in relation to the current requirements of their intended teaching fields.

2. Academic Preparation of Undergraduates. Though no particular program of studies is necessary for admission to the Faculty, students should anticipate their teaching fields if possible and obtain a thorough background in them. Students planning to enter elementary education should include courses in art, music and theatre in their secondary school program since these elective courses provide the cultural background skills desirable for all elementary teachers. Students entering the Faculty should, where possible, complete courses across a wide spectrum in order to have a broad and balanced background.

3. Academic Preparation of Graduates Who Wish to Become School Teachers
To enter either of the one-year programs for graduates, a student must have completed a degree at a recognized university, with acceptable standing and content and in which at least 24 of 60 units are at the senior level.

Note:

The Faculty of Education is proposing to extend its program of teacher education for graduates of other faculties to two academic years or the equivalent. Interested persons should consult the Faculty for information about the potential revision of admission and program requirements.

(a) **for the one-year program (Elementary),** candidates will be considered if they have obtained an average of 65% or higher in the last two years or in the senior courses of a major.

(b) **for the one-year program (Secondary),** candidates will be considered if they have obtained an average of 65% or higher in the senior courses of an acceptable major or in the senior courses of each of two acceptable academic concentrations.

Applications will be accepted from those who hold a degree (as described above) with academic concentrations or major of appropriate content. Courses and standings must be equivalent to those listed in the Secondary Programs sections. Subjects marked with an asterisk must be accompanied by a concentration in a subject not so marked: agriculture*, anthropology*, art, Asian area studies*, biological sciences, Canadian studies, chemistry, Chinese*, computer science, commerce, creative writing, economics*, English, French, geography, geology, German*, history, home economics, Italian*, Japanese*, mathematics, music, physical education*, physics, political science*, Russian*, sociology*, Spanish* and theatre*.

Students with degrees in pharmacy, forestry, agriculture, or commerce, for example, will be considered if they have completed sufficient appropriate courses which provide background for teaching secondary school.

Students may be required to make up deficiencies in their teaching fields before being recommended for a teaching certificate and before having their

standings reported to the Ministry of Education. Any requirements resulting from deficiencies in academic preparation will be in excess of the unit requirements for the one-year program.

4. Practical Experience Desirable. Experience shows that, in general, students who have had practical experience with youth groups and children's activities achieve the greatest success in the teacher preparation programs and subsequently in the teaching profession. It is strongly recommended that students arrange to gain as much experience with children as possible before and after their enrolment in the Faculty of Education.

5. Admission With Advanced Standing

(a) Students working toward an undergraduate degree must complete the equivalent of two full years of study at U.B.C. before the degree will be granted. These years must normally comprise the basic professional education courses, including student teaching, and the courses for the professional concentration(s) or major. For those who enter the Faculty of Education after completing an acceptable basic teacher education program, the two years of full time study will normally include the senior courses of the student's concentration(s) or major. This regulation sets an upper limit on the amount of credit which can be transferred to any degree program at this University. A teacher within a few courses of completing a degree at another institution should seek authority to complete that degree by taking courses at U.B.C. for transfer to the home institution. Because of the accelerating rate of change in subject matter students may not be granted credit towards the degree on the basis of course work taken more than 10 years prior to the time of transfer.

(b) No student will be admitted to the Faculty of Education who has failed the work of the last year spent as a student in another Faculty.

(c) Students transferring from one degree program (whether inside or outside the faculty) to another will be given credit for those courses already completed which meet the requirements of the newly selected program. No credit for the professional courses of the elementary program will be granted to Elementary Program students transferring to the Secondary Program, unless the candidate has completed all qualifying work for the Standard Certificate at the time of transfer.

(d) A student who has completed courses at another university must submit to the Registrar a transcript of record to be evaluated toward the requirement for a degree in Education. Once registered in the Faculty the candidate may expect credit for courses subsequently taken elsewhere only when prior permission has been obtained from the Teacher Education Office. With prior written approval of the Committee on Admissions, Standings, and Courses a course may be taken through a regional college for credit by a student studying in the upper years of a degree program. Direct such enquiries to the Teacher Education Office.

(e) No student may be given more than 30 units of credit toward the Education Degree for work taken in non-university institutions such as college, art school, music conservatory, and normal school and/or in a combination of such institutions.

(f) Courses completed through the B.C. Ministry of Education Summer School of Education are no longer considered for credit toward a degree in Education. Similar courses completed outside the province will not be considered for credit toward a Bachelor of Education Degree, although in both instances suitable adjustments will be made to the candidate's program to take into account content of courses completed.

(g) A student who has completed the two or three years in a British or Commonwealth training college is granted credit for one year of basic professional training (15 units). Further academic credit is granted toward a Bachelor of Education (Elementary or Secondary) for courses that are suitable and transferable. It is the responsibility of the student to obtain for the Registrar a syllabus which will indicate the content of the courses undertaken and the approximate number of lecture hours devoted to each aspect of the training. Graduates of a three-year training college will be granted 30 units. Direct queries about credit beyond 30 units to the Student Programs Office of the Faculty.

(h) Students who wish to complete concentrations or majors in music or art and who hold diplomas in those fields from recognized institutions may be granted some credit toward an Education degree. Limited credit may be granted in fields such as industrial education, physical education, commerce or home economics on the basis of study at an institute or technical college. Direct enquiries to the Teacher Education Office.

(i) The Faculty of Education has no program leading to a B.Ed. Degree for those who already hold a degree from another Faculty. Such students may enrol in the One-Year programs (Elementary or Secondary) if they meet admission requirements.

III. ACADEMIC REGULATIONS

Material in this section is supplementary to that given in the General Information section of the calendar, and applies specifically to students enrolled in this Faculty.

A. English Composition Requirement

In order to qualify for the degree of Bachelor of Education (Elementary, Secondary, or Special Education), students must satisfy the English Composition Requirement. This means that in addition to completing all English course requirements set out in their degree programs, students must pass the English Composition Test. Students entering the Faculty of Education at Year Two should satisfy the requirement as early as possible, and in no case after Third Year. Those entering the Third or later years of the program must pass the Composition Test within one academic year of their initial registration in the Faculty of Education. Those registered in the One-Year Program for Graduates of Other Faculties, or in Diploma programs leading to Teacher Certification, must pass the Test before they are deemed to have completed their programs.

Students who have credit for English 100 or who are registered in Teacher Education Programs for graduates of other faculties, Diploma programs leading to Teacher Certification, or the Accelerated Industrial Education program may write the Test in late September. The test will also be given during the December examination period in late March or April, and in July. Students taking the ECT must attach to the examination booklet either a "Fee Waived" sticker (given to those taking the exam for the first time), or a "Fee Paid" sticker which must be purchased in advance from the Department of Financial Services for a fee of $10.00. Students enrolled in English 100 will, if eligible, receive a "Fee Waived" sticker from their instructors.

Students who anticipate difficulty passing the Test are advised to enrol in a remedial English course in the Centre for Continuing Education.

B. Oral English Requirement

All students admitted to the Faculty of Education must pass the Test of Competence in Oral English at the time of their first registration, or within the following year. The Test is administered by the Faculty of Education on days when the university composition examination is given, and by special arrangement. Students who do not pass the Test will be required to undergo an evaluation of their spoken English by the Faculty of Education. The results of both the Test and any subsequent evaluation will be used to determine whether students will be required:

(1). to undertake a program of remedial work in spoken English, and/or to obtain further language counselling; *or*

(2). to withdraw from the Faculty if their language difficulties are such as to preclude effective participation in course work and in the teaching practicum required in all undergraduate programs.

C. Advancement

Students will be promoted from the second year to the third year of the B.Ed. (Elementary, Secondary, and Special Education) programs providing they have attained an average of 65% or higher on the best 24 units of coursework including first year English.

Students will be promoted from the fourth year to the fifth year in the B.Ed. (Secondary and Special Education) programs providing they have attained an average of 65% or higher in 24 units of course work prescribed for the senior years.

D. Unsatisfactory Standing

A student who meets the minimum requirements for passing in a given year but whose standing is nevertheless considered by the Faculty to be unsatisfactory will be placed on probation for the following year. At the end of the probationary year the student may be reinstated or, if there has been insufficient improvement, will not be permitted to proceed to the next higher year. Generally speaking, probation will follow (a) in the 1st and 2nd years—failure to earn an average of 55% in the 15 units of work in each of the two years (b) in the 3rd and 4th years—failure to earn an average of 60% in the concentration(s) or major(s).

Regulations concerning probationary standing also apply to students of the Faculty undertaking course work in summer session, through extra-sessional classes or by correspondence. A student who fails student teaching is considered to have failed the entire year.

Essays and examinations will not be given a passing mark if they are deficient in English.

E. Supplemental Examinations

(1). In any session a student will be granted the privilege of writing supplementals in not more than three units of courses taken during that session provided that: the final examination in the subject concerned had been written and assigned a final grade of at least 40%; at least 60% of a course load of over 6 units is

passed or at least 50% of a course load of 6 or fewer units is passed.

(2). The Faculty may, at its discretion, grant supplemental privileges in a further 3 units to a student whose course work during a full winter session is in excess of 15 units.

(3). At the discretion of the Faculty, arrangements may be made in certain cases for further periods of student teaching.

F. Academic Appeal

An appeal, in general, falls into two categories — request for a review of standing assigned in a course or protest of a decision in relation to academic studies, existing rules, regulations and policies. These are dealt with in the General Information section of the Calendar, the first under the heading of Review of Assigned Standing and the second under General Academic Regulations — Appeal Procedure.

In the Faculty of Education, the second type includes the following additional step. A student who is dissatisfied with the result of an appeal at the level of the instructor and department head may submit to the Committee on Admissions, Standings and Courses, through the Teacher Educations Office, a written statement. It should indicate the precise appeal and the reason it should be granted. If the student is not satisfied with the decision of the Committee, the appeal may then be submitted to the Dean.

G. Examinations for Higher Standing

Before a Bachelor of Education is granted a student must have completed the senior work in a field or fields of specialization with an average of at least 60%. If such standing has not been obtained and, consequently, a degree not granted, the student may rewrite final examinations in one or more of the courses for higher standing, repeat one or more of the courses in order to obtain higher standing, or take acceptable alternative courses and substitute the marks so attained for the lowest previous marks.

H. Student Teaching

The student teaching component is one of the most critical single items in the preparation of a teacher. Although it carries no separate unit value student teaching counts for one-third of the student's overall standing at completion of the program.

Students who are absent due to illness for a significant portion of any block of student teaching may be required to submit a certificate obtained from a doctor during their illness.

Blocks of student teaching are spaced throughout the various teacher preparation programs to obtain an integration of theory and practice. Because of the heavy load that student teaching places on the public schools and the large number of Education students involved each year, it is generally impossible for a student to complete all student teaching in schools close to the university. As a regular part of their program Education students must be prepared to meet the personal expenses of:

(a) in-term student teaching in any of the school districts adjacent to Vancouver, and

(b) post-sessional student teaching in districts throughout the province, exclusive of the metropolitan area. Students must be prepared to travel up to 50 miles one way for any practicum.

I. Acceleration

Students enrolled full-time in a winter session will undertake 15 units of work in most years of the degree programs. In the Elementary Program the student's load in Year Three and in Year Four is 18 units, plus student teaching. In normal circumstances a student cannot accelerate in order to complete the degree program in less than four years. In the Secondary Program permission to accelerate may be granted at the end of the second year, if the student has achieved at least second class standing in the work of the first two years, and can complete the required student teaching. No credit will be given for courses taken for the purpose of acceleration unless prior permission to accelerate is obtained from the Teacher Educations Office. Information about the possibility of accelerating when enrolled in the Bachelor of Education (Special Education Major) can be obtained from the Teacher Educations Office.

J. Requirements for Graduation

(1). To be eligible for the Bachelor of Education degree the candidate must normally have earned:

(a) A mark of at least 50% in each of the courses comprising the degree program;

(b) An average of not less than 60% in the senior courses of each of the concentrations or in the major which constitute the candidate's program.

(2). To be eligible for a Diploma in Education the candidate must normally have earned an average of not less than 65% in the senior courses which constitute the candidate's program.

K. Standing on Graduation, B.Ed. degree

The calculation of degree standing is based two-thirds on the academic courses and the professional course work of basic teacher preparation, and one-third on student teaching.

L. Revision of Programs

All programs outlined by the Faculty will be subject to revision in the light of current requirements, if not completed within ten years.

IV. LICENSING AGENCIES AND PROFESSIONAL ASSOCIATIONS

A. Admission to the Teaching Profession

Students preparing to enter the teaching profession should make contact with the B.C. Teachers' Federation and inform themselves concerning teacher certification levels and teacher qualification levels.

1. Certificate of Qualification (Teacher Certification)

Possession of a teaching certificate is mandatory for teaching within the public elementary or secondary schools of British Columbia. By Sections 4(j) and 15(f) of the School Act, the authority to issue teaching certificates and to determine the grades or classes of certificates of qualification issued, rests solely with the Provincial Ministry of Education.

Teaching credentials are issued to qualified teachers by the Office of the Director of Teacher Services, Ministry of Education, Victoria, B.C., V8V 2M4. The level of certification issued is normally related to the type of degree program elected by the student and to his or her degree standing, as reported by the university.

After having completed an approved teacher education program at a provincial university, it is the responsibility of the student to make application for certification to the Director of Teacher Services. Those eligible on the basis of full-time attendance will receive a formal application with their university marks statement.

The Faculty reports confidentially, to the Director of Teacher Services, Ministry of Education, the names of students who have completed normal requirements for teacher certification. This report includes birth date and degree program information; a copy of each student's permanent record at UBC is forwarded with the report. Students wishing to be excluded from this report should inform the Associate Dean (Teacher Education), Faculty of Education, in writing before May 15 (Spring graduation) or October 1 (Fall graduation).

The Faculty also reports to each public school District Superintendent the names and addresses of students expected to qualify for initial teacher certification. This report includes program information but does not include birth date; copies of students' permanent records are not forwarded with this report. Students wishing to be excluded from this report should inform the Associate Dean (Teacher Education), Faculty of Education, in writing before January 15.

Types of Credentials

(a) Standard Certificate.
Requires completion of a 3-year approved program of post-secondary school studies beyond Grade XII (or equivalent), including an appropriate one-year program of teacher education.

(b) Professional Certificate.
Requires completion of a minimum of 4 years of an approved program of post-secondary school studies beyond Grade XII (or equivalent), including basic teacher education and qualification for a degree. Most programs in the Faculty are of such duration that students will be eligible for the Professional Certificate. Exceptions are the Accelerated Industrial Education program and the Native Indian Teacher Education Program.

Standard and Professional teaching certificates issued to graduates of provincial universities are non-expiring and remain valid for life, unless suspended or cancelled for cause by the Lieutenant Governor in Council.

Other Considerations

Persons convicted of a criminal offence and considering a teaching career, should write the Director of Teacher Services for clarification of their status *before* undertaking a teacher education program.

2. Qualification Categories

The Teacher Qualification Service, sponsored jointly by the B.C. Teachers' Federation and the B.C. School Trustees' Association, is an advisory service to teachers and school boards. The Service acts only upon application by a teacher and only after the individual has been granted a British Columbia teaching certificate by the provincial Ministry of Education.

Qualifications are evaluated in categories assigned on the basis of complete years of professional preparation; partial years are not evaluated. At present the Service recognizes six categories, each corresponding to the number of years of training acceptable to the Teacher Qualification Board. One of the years must be a professional year. Broadly speaking the B.C. *Teaching Licence* qualifies for T.Q.S. Category 1 or 2, the *Standard Certificate* for Category 3 or 4 and the *Professional Certificate* for Category 4, 5 or 6.

Those who complete the Bachelor of Education (Elementary) will qualify for Category 4. Those who complete a Bachelor of Education (Secondary), Bachelor of Education (Special Education), or add an acceptable additional year of study beyond the Elementary Education Degree, or who have an acceptable Bachelor's Degree and complete the One-Year Program for Graduates (either Elementary or Secondary) will qualify for Category 5. Those who have completed six or more years of

training and have obtained an acceptable Master's Degree and other certification requirements qualify for Category 6.

"Request for evaluation" forms are available from the Teacher Education Office, Faculty of Education and from the Teacher Qualification Service office at: 210-2609 Granville Street, Vancouver, B.C., V6H 3H3. The T.Q.S. telephone number is: 736-5484.

B. Professional Association

Under current legislation, teachers of the province automatically become members of the British Columbia Teachers' Federation. Information concerning the teacher's professional association can be obtained from the Federation Office: 105-2235 Burrard Street, Vancouver, V6J 3H9 (telephone number: 731-8121). Information about vacancies as well as teaching conditions in every district of the province is obtainable from the Employment Information Service. The Lesson Aids Service provides duplicated material to teachers. Officials of the Federation can answer questions about appointments and contracts.

The official publications of the British Columbia Teachers' Federation are issued to Education students for a nominal fee. They carry many useful articles on up-to-date teaching practices and other topics of professional interest.

In the spring the B.C.T.F. can provide mimeographed lists of current salary scales in all school districts of the province.

V. TEACHER EDUCATION PROGRAMS

A. ELEMENTARY EDUCATION

1. Undergraduate Degree Programs B.Ed.(Elementary)

All students entering the undergraduate programs, described in (a) and (b) below, will be required to complete the full degree program before qualifying to teach.

Note:

The Faculty of Education is proposing to revise its undergraduate degree programs. Interested persons should consult the Faculty for information about the potential revision of admission and program requirements.

In anticipation of this revision, no students will be admitted in 1986 to the first year of on-campus programs leading to the B.Ed. (Elementary). Students should seek initial admission to other degree programs and select courses in relation to the current requirements of their intended teaching fields.

(a) The Four-Year Program

Students may enter this program from Grade Twelve, or from first or second year in a college or another faculty. All programs outlined by the Faculty will be subject to revision in the light of current requirements if not completed within ten years. In choosing their courses, students should consult the Undergraduate Handbook for information about prerequisites for academic concentrations.

First Year	Units
English 100	3
A social science, such as anthropology, economics, geography, history, philosophy, psychology, or sociology*	3
A first year laboratory science, such as Science Education 190, biology, chemistry, Geography 101, Geology 105 or physics*. (Students considering an academic concentration in science, or a professional concentration or major in Science Education should select a laboratory science course in one of the science fields.)	3
Six units of any offerings, normally at the 100 or 200 level, from the Faculties of Arts or Science, or the School of Physical Education, or Art Education 100, or Music Education 101, or Music Education 102	6
(Art Education 100 is prerequisite for an Art concentration or major; Music Education 101 is prerequisite for a Music concentration or major; Physical Education courses are prerequisite for a Physical Education concentration.)	
	15

*May be taken in either First or Second year.

Second Year	Units
English at the 200 level	3
Prerequisite for the Academic Concentration (or academic elective, if no prerequisites needed)	3
Academic electives (normally at the 100 or 200 level)*†	6
Reading Education 305	3
Education 297—(Seminars, classroom experience and post-sessional practicum)	0
	15

*English 303 is strongly recommended.
†Computing Studies Education 217 may be taken.

Third Year†	Units
Education of Young Children 303 or English Education 304	3
Educational Psychology 310 and 311, or 331††	3
Science Education 321 and Social Studies Education 322	3
Art Education 323, Music Education 324 and Education 325	3
Mathematics Education 369	3
One of Educational Studies 400, 407, 430 or 470	3
Education 397	0
	18

††Students who plan to take the Young Children Concentration must take Educational Psychology 331. Students who plan to take the Primary Concentration may take Educational Psychology 331, or 310 and 311. All other students must take Educational Psychology 310 and 311.

Fourth Year	Units
Completion of the Professional Concentration	9
Completion of the Academic Concentration	9
Education 497*	0
	18

*Education 497 is weighted one-third in determining overall standing in the degree program.

(b) Programs for Students Transferring from Other Faculties

Students may transfer to the four-year B.Ed. program not later than the completion of their second year in another college or faculty.

(1) Transferring to Second Year

Students with full first year in another faculty or college or the equivalent will take the regular second year as specified above.

If the first year is incomplete, they will take the full second year program and complete the deficient first year courses in the following summer session.

(2) Transferring to Third Year

Students with 24-30 units from a college or another faculty will normally take the following program and must complete the final two years before being recommended for a teaching certificate. Students with 24 or more units but less than 30 can make up the deficiency in Summer Session:

Third Year†	Units
Education of Young Children 303 or English Education 304	3
Reading Education 305	3
Educational Psychology 310 and 311 or 331††	3
Science Education 321 and Social Studies Education 322	3
Art Education 323, Music Education 324 and Education 325	3
Mathematics Education 369	3
Education 397	0
	18

†Third year students must select their programs from amongst the appropriate optional programs described in the section on Optional Professional Programs.

††Students who plan to take the Young Children Concentration must take Educational Psychology 331 instead of 310, 311. Students who plan to take the Primary Concentration may take Educational Psychology 331 or 310 and 311. All other students must take Educational Psychology 310 and 311.

In the subsequent year students who transferred to Third Year are classified as Fourth Year Regular students and take the following courses:

One of Educational Studies 400, 407, 430, 470	3
Completion of a Professional Concentration	9
Senior academic electives in one field**	6
Education 497*	0
	18

*Education 497 is weighted one-third in determining overall standing in the degree program.
**If possible, students must complete both an academic and a professional concentration (see section (e) below).

(c) Program for Native Indian Students

The Native Indian Teacher Education Program is intended for native Indian students, status and non-status. It includes similar requirements for both liberal and professional education to those of the B.Ed. (Elementary) program for regular students. NITEP is designed to strengthen and build upon the personal and cultural resources shared by native Indian students.

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The basic professional studies and much of the student teaching are completed during the first two years of study at field centres located throughout the province. The academic and professional concentrations and remaining student teaching are completed at UBC during the senior years of study. In addition to four years of full-time study, students should be prepared to attend at least one summer or spring session to complete the requirements of the B.Ed. (Elementary) degree. Students transferring into NITEP are required to spend at least one year of study at a field centre.

NITEP students may elect to complete all degree requirements before applying for a Professional Teaching Certificate. Alternatively, they may apply for the Standard Teaching Certificate after completing all student teaching requirements and 48 units of approved course work.

(d) Program for Candidates Holding Teaching Certificates

Students who are graduates of a recognized Canadian, British, or other normal school or teacher's college will seek admission through the Office of the Registrar. The credit granted will be applied against the requirements of the undergraduate degree program as outlined above. The remaining courses will be undertaken through the University. Note that a student must complete a minimum of two years of study before a degree can be granted.

Teachers who have completed the professional training longer than 10 years ago and who have not taught within the last 10 years will have their programs reviewed by the Teacher Education Office.

Students who hope to complete all or part of this program by summer session, correspondence, spring session or extra session are warned that courses are not always available when required and that graduation may have to be delayed for this reason.

(e) Concentrations and Majors

Students on the regular program are required to complete two concentrations, one academic (courses are chosen from offerings in the Faculties of Arts and of Science) and one professional (courses offered in the Faculty of Education).

In Art, Music, Mathematics and Science Education students may substitute a major for the two concentrations (academic and professional) described above.

Successful completion of a Bachelor of Education degree requires an average of 60% in the senior courses of the concentrations or of the major.

(1) Academic Concentrations

In the regular program an academic concentration consists of 9 units of senior arts or science courses in a particular field, plus any first or second year prerequisite courses. Full details of each of these concentrations may be obtained from the Undergraduate Handbook prepared by the Teacher Education Office and from the advisers named therein. Academic concentrations are offered in anthropology, Asian studies, biology, Canadian studies, chemistry, classical studies, creative writing, economics, English, history of fine arts, French, geography, geology, German, history, Italian, linguistics, mathematics, philosophy, physics, political science, psychology, religious studies, Slavonic studies, sociology, Spanish, theatre, and zoology.

It is not the primary function of the academic concentration in the Elementary Program to prepare teachers in the field of specialization, but rather to give each student an opportunity to develop an intellectual interest to some depth.

(2) Professional Concentrations

These concentrations consist, in the main, of courses offered by the Faculty of Education and are intended to prepare teachers more fully in certain subject areas or grade levels. Following are the details of the professional concentrations offered.

(f) Professional Concentrations and Majors

(1) Art Education Concentration and Major

Students must take the courses in the sequence described below. Students hoping to transfer into this program must qualify by (1) showing work of an acceptable standard* and (2) making up any deficiencies in their programs. These qualifying courses may have to be done extra-sessionally or at summer session.

Enrolment in all studio courses limited to 20.

First Year: Art Education 100 and Fine Arts 100. Students must obtain at least a second class standing in Art Education 100 to be eligible for an art concentration or major.

Concentration

Second Year: Art Education 201.

Fourth Year: Art Education 302 and 425; one of Art Education 303, 305, 307, or 442;

Major

Second Year: Art Education 201 and 302.

Fourth Year: Nine units of Art Education 303, 305, 307, 401, or 442; Art Education 425 and 441.

*Transfer students should arrange an interview and present a folio for adjudication prior to the third week of April. Any inquiries and appointment arrangements must be made with the Head, Department of Visual and Performing Arts in Education. The adjudication is done by a committee.

(2) Early Childhood Concentrations

Primary Education (Grades 1, 2, 3)

Education of Young Children 405 and English Education 341; three units from Art Education 425, Education 306, 326; Education of Young Children 333, 334, 336, 433; English Education 335, 486, 489; Music Education 307, Science Education 309, Social Studies Education 402, Special Education 312, 406, 419.

Education of Young Children (Pre-school and Kindergarten)

Education of Young Children 333, 334, 336 and 433.

The Child Study Centre, 2855 Acadia Road, is available to students enrolled in the courses of the concentration for observation, research, and participation in working groups of young children.

(3) French Education Concentration

Second Year: French 202 and 220.

Third and Fourth Years: Modern Languages Education 393 and 6 units from Modern Languages Education 340, 394, 396, 489, French 302, 305, 306, 316, 334, 335, 402, 414-418 (inclusive).

(4) Intermediate Education Concentration

Curriculum and Instructional Studies 487; six units of electives to be approved by the Teacher Education Office.

(5) Language Arts Concentration

6 units from English Education 340, 341, 478, 480, 486, 489;

3 units from the preceding courses or from English Education 335, 337, 338, 349, 416; Library Education 389; Reading Education 473, 475; Special Education 312, 313, 315; or 3 units approved by the Head, Department of Language Education.

(6) Mathematics Education Concentration and Major

Concentration

Mathematics Education 372, 373, 485, and either 471 or 488;

3 units of Mathematics (Education electives approved by the Head, Department of Mathematics and Science Education, may be taken if the Mathematics requirement has already been satisfied).

Major

First and Second Years: Mathematics 100 or 111, 101; 200, 221, Computer Science 114 and 116, or 118.

Fourth Year: Mathematics Education 372, 373, 485, and either 471 or 488; nine units of mathematics, 3 units of which may be chosen from Mathematics 201, 205, 220 and at least 6 units should be chosen from mathematics courses at the 300 or 400 level, in consultation with the Head, Department of Mathematics and Science Education; and 3 units of academic or professional electives chosen in consultation with the Head, Department of Mathematics and Science Education.

(7) Mathematics and Science Education Concentration

First and Second Years:

(a) Three units of a laboratory science chosen from Biology 101, 102, Chemistry 103, 110, 120, Science Education 190, Geology 105, 107, Physics 110, 115, or 120, **and**

(b) Three units of mathematics chosen from Mathematics 100, 101, 111, 130; Statistics 105, 203.

Fourth Year: Nine units, including at least three from each of:

(a) Science Education 309, 409.

(b) Mathematics Education 372, 373, 471, 485, 488.

(8) Music Education Concentration and Major

First Year: Music Education 101. Students must obtain at least a second class standing in this course to be considered for either a concentration or a major.

First or Second Year: Music Education 102.

Second Year: Music Education 201. A student must obtain at least a second class in this course in order to continue in the concentration or the major.

Concentration

Fourth Year: Music Education 302; Music Education 303; 3 units from Music Education 104, 105, 307, 400, 401, 405, Music 102, 112, 122.

Major

Fourth Year: Music Education 302, 303; and 12 units from Music Education 104, 105, 307, 400, 401, 405, Music 102, 112, 122.

Note: Neither the concentration nor the major can be completed entirely by Summer or Extra Session.

(9) Native Indian Education Concentration

Fourth Year: Education 479; Anthropology 301 or 329 or Education 342;

3 units selected from: Curriculum and Instructional Studies 396; Education 240, 342; English Education 486, 489; Social Studies Education 402.

(10) Physical Education Concentration

First and Second Years: Physical Education 161, 164, 201, 203, 218, 240; one of Physical Education 209, 211, 213, 214, 216, 219; and one Physical Education performance elective.

Fourth Year: Education 326; Physical Education 262, 369; and 3 units of senior Physical Education electives. (Recommended senior electives: Education 306; Physical Education 343, 362, 366, 368, 460, 462; Recreation 394.)

(11) Reading Education Concentration

4½ units from Reading Education 472, 473, 475, 477. (Experienced teachers may elect Reading Education 476 as 3 of the 4½ units); 3 units from English Education 335, 341, 478, 480, 489; 1½ units from English Education 337, 338, 349, 486; Library Education 389; Reading Education 474; Special Education 312 or 1½ unit elective approved by the Head, the Department of Language Education.

(12) Science Education Concentration and Major Concentration

First and Second Year: 3 units of a laboratory science chosen from Biology 101, 102; Chemistry 103, 110, 120; Science Education 190; Geology 105; Physics 110, 115, 120. Students are advised to take as an elective an additional science course, preferably in second year.

Fourth Year: Science Education 309 and 409 (3 units); and 3 additional science units or Education 380.

Note: Students are advised to take as an elective an additional science course, preferably in second year. Education 380 is also recommended.

Major

First and Second Year: 6 units of laboratory science chosen from Biology 101 or 102; Chemistry 103 or 110 or 120; General Science 190; Geology 105; Physics 110 or 115 or 120.

Fourth Year: Education 380; Science Education 309 and 409 (3 units); 9 units of elective science courses approved by Science Education advisers.

(13) Social Studies (Elementary) Concentration

Fourth Year: Social Studies Education 402; 3 units of senior courses in anthropology, Asian studies, classical studies, economics, geography, history, history of fine arts, history of music, philosophy, political science or sociology; 3 units of Art Education 425, 494, 496; Education 380, 479; Education of Young Children 405; English Education 468; Library Education 389; or Social Studies Education 469.

(14) Special Education Concentration

Special Education 312; 7½ units selected from Educational Psychology 434; Special Education 313, 314, 315, 316, 317, 403, 406, 408, 419, 420, 421, 423, 424, 429, 431, 434, 436, 437, 448.

(15) Teaching English as a Second Language Concentration

One of English Education 489, English 329, Linguistics 100, 200, 420. English Education 478. Three units from: Computing Studies Education 417; Education 479; English Education 335, 337, 338, 379, or 480; another course in linguistics or Anthropology 417.

2. Programs in Elementary Education for Graduates

(a) One-Year Program (Elementary) for Graduates of Faculties Other than Education

Students will complete either the Collaborative Program for Professional Development (CPPD) or one of the appropriate programs described in the section on Optional Professional Programs which include:

One of Educational Studies 400, 407, 430, 470	3
Educational Psychology 331 or 310 and 311	3
Mathematics Education 369	3
Education of Young Children 303 or English Education 304	3
Science Education 321 and Social Studies Education 322	3
Art Education 323, Music Education 324, Education 325 or, for students with suitable backgrounds, one of Art Education 425, Education 326, Music Education 307. (Faculty consent is required for Art Education 425 or Music Education 307.)	3
Education 497*	0
	18

*Education 497 is weighted one-third in determining overall standing in this program.

(b) Fifth Year Program for Graduates with Bachelor of Education (Elementary) Degree

Graduates of the four-year program in Elementary Education may undertake a fifth year of study in one of three ways: (1) by applying for a qualifying year, through the Graduate Studies Office, (2) by applying for the Diploma in Education, or (3) by applying for a program to qualify for teaching in the secondary school. The latter two programs are planned by the Teacher Education Office.

B. SECONDARY EDUCATION

1. Undergraduate Degree Program B.Ed. (Secondary)

Note:

The Faculty of Education is proposing to revise its undergraduate degree programs. Interested persons should consult the Faculty for information about the potential revision of admission and program requirements.

In anticipation of this revision, no students will be admitted in 1986 to the first year of on-campus programs leading to the B.Ed. (Secondary). Students should seek initial admission to other degree programs and select courses in relation to the current requirements of their intended teaching fields.

(a) Three types of degree programs are offered:

i. *The Bachelor of Education (Secondary) General Program* indicating that the graduate is prepared to teach two secondary school subjects and has successfully completed two appropriate academic concentrations.

ii. *The Bachelor of Education (Secondary) Major Program* indicating that the graduate has completed a major course in a subject.

iii. *The Bachelor of Education (Secondary) Honours Program* indicating that the graduate has completed an honours course in a subject.

All programs outlined by the Faculty will be subject to revision in the light of current requirements if not completed within ten years.

First Year	**Units**
English 100	3
Electives and courses required for academic concentrations or major	12
	15

Note: Students may elect the Arts I program and be credited with 9 units including English 100. (For further information see Faculty of Arts section of the Calendar.)

Second Year	**Units**
Educational Studies 200	3
English at the 200-level	3
Electives or courses required for academic concentrations or major	9
	15

Third Year	**Units**
Education 298	0
Educational Psychology 301, 302	3
Courses required for academic concentrations or major	9
Academic elective*	3
	15

Fourth Year	**Units**
English 303 or 304	3
Educational Psychology 332	3
Courses required for academic concentrations or major	6
Academic or Professional elective*	3
Education 498 (Seminar and post-sessional practicum)	0
	15

*Academic electives of the third and fourth years should ordinarily be numbered 300 or above. Attention is drawn to the possibility of using these electives to develop an additional academic concentration. Any professional elective selected is to be chosen from among the possibilities of Fifth Year (see below).

Fifth Year†	**Units**
One of Educational Studies 400, 407, 430, 470	3
Curriculum and Instruction courses corresponding to academic concentrations or major	3-6
One of Education 449 (Educational Psychology), Educational Psychology 401, 428, 434, 435, 461, 462, 481, 482, 483	1½-3
3-9 units chosen from Adult Education 412; Business Education 410; Computing Studies Education 317, 400, 417; Counselling Psychology 426, 427; Curriculum and Instructional Studies 361, 396**; Education 380, 413, 479; Educational Administration 460; Educational Psychology 401, 428, 434, 435, 461, 462, 481, 482, 483; Educational Studies 400, 407, 430, 468, 470; English Education 337, 338, 349, 416, 478,	

489; Higher Education 493; Library Education 381, 383, 384, 387, 388, 389; Mathematics Education 471, 485, 488; Modern Languages Education 394; Reading Education 472, 474; Special Education 312; 313, 314, 316, 317, 318, 403, 408, 418, 423, 429, 431, 436, 437; or 3 units of the above courses and 3 units of appropriate senior academic work, which must be approved in advance by the Teacher Education Office	3-9
Education 499 (Seminar and in-term and post-sessional practica)	0
Total for the Fifth Year	15-18

*Education 499 is weighted one-third in determining overall standing in the degree program.

**Maximum of three units.

Students are recommended for certification only after achieving satisfactory standing in both student teaching and in all course work requirements of the degree program.

†Fifth year students must select their program from amongst the appropriate optional programs described in the section on Optional Professional Programs.

(b) Program for candidates holding teaching certificates

Students who are graduates of a recognized normal school or teachers' college will seek admission through the Office of the Registrar. The credit granted will be applied against the requirements of the undergraduate degree program as outlined above. The remaining courses will be undertaken through the University. Note that a student must complete a minimum of two years of study before a degree can be granted.

Teachers who have completed the professional training longer than 10 years ago, and who have not taught within the last 10 years, will have their programs reviewed by the Teacher Educations Office.

Students who hope to complete all or part of this program by summer session, correspondence, spring session or extra session are warned that courses are not always available when required and that graduation may have to be delayed for this reason.

Notes:

1. Where the student's program permits electives, these should ordinarily be chosen from academic subjects. Only three units of Education courses, other than those which are required, may be counted for degree credit. Courses relating to teaching in the elementary school will not be accepted for credit. Any one of the courses listed as electives in the Fifth Year of the degree program (see above) will carry credit.
2. Where appropriate to the student's academic concentration or major, Art Education 425 or Music Education 307 may be substituted for the Art Education 404 or Music Education 404.
3. Students who choose academic concentrations or major in agricultural sciences, art, Chinese, creative writing, earth and space science, German, industrial education, Italian, Japanese, music, Russian, Spanish or theatre are warned that they will not be able to complete their work entirely by Summer or Extra Session.

(c) Academic concentrations, majors and honours

Students who require advice about the professional aspects of a concentration or of a major should direct such questions to the head of the appropriate department within the Faculty of Education. Those who wish to have information about the courses themselves or the instructors of the current Winter Session, should consult the appropriate department in the Faculty or the School in which the courses are offered.

ACADEMIC CONCENTRATIONS, MAJORS AND HONOURS

Study programs leading to the B.Ed. (Secondary) degree are of three types:

(i) General—requiring **concentrations** in two fields of study.
(ii) Major—requiring a **major course** in a subject.
(iii) Honours—requiring an **honours course** in a subject.

In the following list of fields of study, "C" indicates that a **concentration** is offered, "M" a **major course,** and "H" an **honours course.**

Subjects marked with an asterisk must be accompanied by a concentration in a subject not so marked.

Agriculture* C
Art C M H
Biological Sciences C M
(Biology) H
(Botany) H
(Zoology) H
Business Education C M
Canadian Studies C
Chemistry C M H
Chinese* C
Computer Science C M
Creative Writing* C
Earth and Space Science C M
English C M H
French C M H
German* C
Home Economics C M
Industrial Education M H
Italian* C
Japanese* C
Mathematics C M H
Music C M
Physical Education C
Physics C M
Russian* C
Social Studies
(Emphasis on Geography) C M
(Emphasis on History) C M
(Emphasis on Social Sciences)* C
Spanish* C
Theatre* C

An average of 60% at least is required in the senior courses of each of the academic concentrations or major which constitute a candidate's program.

Candidates who have the required standing at the end of the second year may, with the consent of the Teacher Education Office, complete an honours course. At least 81 units of work will be required in the five years of the program. Details of such a program must be arranged in consultation with the Head of the appropriate Department in Arts, Science, or Education. The student must maintain a second class average or better in each of Third and Fourth Years. A graduating essay (of 3 to 6 units) may be required.

Only with the prior permission of the Teacher Education Office may exceptions be granted in any of the requirements in the following majors:

(1) Agricultural Sciences Concentration

First Year: Biology 101 or 102; Chemistry 103, 110 or 120; Mathematics 100 and 101; Physics 110, 115, or 120.

Second, Third and Fourth Years: Agricultural Sciences 110; 4½ units of prescribed courses; Plant Science 258; Agricultural Economics 258; 6 units numbered 300 or above in approved Agricultural Sciences courses. Geology 105 recommended.

Note: Only 3 units of English at the 200-level or 303 need be taken.

This concentration cannot be completed entirely by Summer or Extra Session.

(2) Art Education Concentration and Major

This concentration or major requires that students take the courses in the sequence described below. Students hoping to transfer into this program must qualify by (1) showing work of an acceptable standard*, and (2) making up any deficiencies in their programs. These qualifying courses may have to be done extra-sessionally or at summer session.

Enrolment in all studio courses limited to 20.

First Year: Art Education 100 and Fine Arts 100. Students must obtain at least a second class standing in Art Education 100 to be permitted to continue.

Second Year: Art Education 201 and 302.

Concentration

Third Year: One of Art Education 303, 305, 307, or 401.

Fourth Year: The advanced course of the third year elective, i.e. one of Art Education 402, 403, 405, or 407.

Fifth Year: Professional year; no Art Education studio courses may be taken this year.

Major

Third Year: Art Education 341; one of Art Education 303, 305; one of Art Education 307 or 401.

Fourth Year: One of the advanced courses of the third year electives, e.g. one of Art Education 402, 403, 405 or 407; Art Education 441.

Fifth Year: Professional year; no Art Education studio courses may be taken this year.

Note: Students are advised to consult Art Education advisers regarding the selection of other electives in their programs.

*Transfer students should arrange an interview and present a folio for adjudication prior to the third week of April. Any enquiries and appointment arrangements must be made with the Head, Department of Visual and Performing Arts in Education.

Studio courses are continued during a practicum.

(3) Biological Sciences Concentration and Major

First Year: Biology 101 or 102; Chemistry 103, 110 or 120; Mathematics 100 and 101; Physics 110, 115, or 120.

Concentration

Second, Third and Fourth Years:

(a) 4½ units from major taxa. Courses must be taken from more than one department: Biology 315; Botany 209, 210, 306, 307, 308, 312; Forestry 111; Microbiology 200, 307; Zoology 203, 205, 306, 311, 413, 415, 416, 420, 424.

(b) 3 units from Physiology, Cytology, Anatomy: Biology 200, 201, 202, 330, 340; Botany 330, 402, 435; Physiology 301, 302; Zoology 303, 304, 307, 408, 428, 429.

(c) 3 units of Ecology: Biology 321, 322, 323, 405; Botany 426, 427; Forestry 204; Zoology 403, 412, 421.

(d) At least 1½ units of Genetics: Biology 334 or 335.

Chemistry 230 may be required as a prerequisite for some courses and is strongly recommended. Geology 107 is strongly recommended.

Note: Only 3 units of English at the 200-level or 303 need be taken.

Major

Second, Third and Fourth Years:

Chemistry 230; Geology 107; Biology 334 or 335.

(a) At least 6 units from major taxa: Courses must be taken from more than one department: Biology 315; Botany 209, 210, 301, 306, 307, 308, 312; Forestry 111; Microbiology 200, 307; Zoology 203, 205, 306, 311, 413, 415, 416, 420, 424.

(b) At least 4½ units from Physiology, Cytology, Anatomy: Biology 200, 201, 202, 330, 340; Botany 330, 402, 435; Physiology 301, 302; Zoology 303, 304, 307, 408, 428, 429.

(c) 3 units of Ecology: Biology 321, 322, 323, 405; Botany 426, 427; Forestry 204; Zoology 403, 412, 421.

(d) At least 3 additional units of biological science chosen from courses listed above or other approved courses.

Recommended additional courses: Zoology 323 and 400.

Note: Only 3 units of English at the 200-level or 303 need be taken.

(4) Business Education Concentration and Major

First and Second Years: Computer Science 114, Economics 100, Mathematics 100 or 140 or 111.

Second Year: Commerce 457 and 458.

Concentration

Third and Fourth Years: Commerce 120 and 261; Business Education 401, 402, and either:

(a) Commerce 271 and at least 3 units from Business Education 377, Commerce 362 or 363 or 364, Computing Studies Education 217.

or

(b) Business Education 166 or 186, 176 and 374.

Major

Third and Fourth Years: Commerce 120, 261, 271, and 331; Business Education 401, and 402; and at least 4½ units from Business Education 166 or 186, 176, 374, 377, Commerce 362, 363, 364, Computing Studies Education 217. Electives must be chosen in consultation with Business Education advisers.

(5) Canadian Studies Concentration

First and Second Years:

(a) Six units of course work significantly Canadian in content or approach.

(b) Six units of anthropology, Asian studies, classical studies, economics, history, history of fine arts, history of music, philosophy, political science, Slavonic studies, sociology or urban studies.

Third and Fourth Years: Nine units of senior course work significantly Canadian in content or approach, arranged in consultation with, and approved by, the Canadian Studies Committee.

Notes:

1. In organizing their overall programs students taking the Canadian Studies concentration should include courses:
   (a) that put Canadian Studies in their wider context,
   (b) that broaden their competence in a particular discipline.
2. Students combining this concentration with a social studies concentration (23, 24, 25 below) may apply no more than 3 units of work for credit in both concentrations.

(6) Chemistry Concentration and Major

Concentration

First and Second Years: Chemistry 103, 110 or 120; 205 **or** 201 and 202; Mathematics 100 and 101; Physics 110, 115, or 120; Biology 101 or 102. Mathematics 200 is required if Chemistry 304 is elected.

Senior Years: Chemistry 230; 310, or 335; three additional units chosen from Third or Fourth Year chemistry courses. Chemistry 304 or 305 and Geology 105 are strongly recommended.

Note: Only 3 units of English at the 200-level or 303 need be taken.

Major

First Year: Chemistry 103, 110 or 120; Mathematics 100 and 101; Physics 110, 115, or 120; Biology 101 or 102.

Second, Third and Fourth Years: Geology 105; Chemistry 205 **or** 201 and 202, 230, 304 or 305, 310 or 335; 6 additional units in senior Chemistry; Mathematics 200.

Mathematics 301 or 315 is recommended.

Note: Only 3 units of English at the 200-level or 303 need be taken.

(7) Chinese Concentration

First and Second Years: Chinese 100, 101, 200. Recommended: Chinese 201.

Third and Fourth Years: Chinese 300, 301, and one of 410 or 411.

This concentration cannot be completed entirely by Summer or Extra Session.

(8) Computer Science Concentration and Major

Concentration:

First and Second Years: Computer Science 114, 116 or 118, 210, 213, and 220; Mathematics 100 or 111, *and* 101. Mathematics 205 and 221 are recommended as electives.

Third and Fourth Years: Computer Science 311, 312, 313, and 430; 3 units from Computer Science 310, 321, 322, 404, 405, 406, 407, 414, 420, 422, or other senior courses approved by the the Department of Mathematics and Science Education.

Major.

First and Second Years: Computer Science 114, 116 or 118, 210, 213, and 220; Mathematics 100, 101, 205, and 221.

Third and Fourth Years: Computer Science 311, 312, 313, and 430; 9 units from Computer Science 310, 321, 322, 404, 405, 406, 407, 414, 420, 422, or other senior courses approved by the Department of Mathematics and Science Education.

(9) Creative Writing Concentration

First and Second Years: English 100; English at the 200-level; Creative Writing 202 or 301.

Senior Years: English 304; two of Creative Writing 403, 404, 405, 406, 407, 408, 409, 410, or 491; a senior academic elective approved by the Department of Creative Writing.

(10) Earth and Space Science Concentration and Major

First or Second Year: Geology 105; Biology 101 or 102; Chemistry 103, 110 or 120; Physics 110, 115 or 120; Mathematics 100 and 101.

Second, Third and Fourth Years:

Concentration

A minimum of 12 units including:

(a) Astronomy 200.

(b) 3-9 units from Geology 305, 312, 321, 322, 421 or other Geology course approved by the Head, Department of Mathematics and Science Education.

(c) 0-6 units from Geophysics 221, 400; Astronomy 302.

(d) 0-6 units of approved units in physical geography, oceanography or soil science. Geography 212, 306, 310, 311, 312, 313, 379, 412, 414; Soil Science 200, 300; and Oceanography 308, 309, 405 are recommended.

Of these 12 units, at least 6 must be numbered 300 or above.

Major

A minimum of 18 units including:

(a) Astronomy 200; Geography 212; Geology 305; and Oceanography 308.

(b) 8 or more units from Astronomy 302; Geography 306, 310, 311, 312, 313, 379, 412, 414; Geology 312, 321, 322, 342, 415, 421, 425; Geophysics 221, 400; Astronomy 302; Soil Science 200, 300; 309, 405.

Notes:

* For the major, Geography 101 may be substituted for Geology 105 with permission of the Head, Department of Mathematics and Science Education.

Only 3 units of English at the 200 level or 303 need be taken.

This Major and Concentration cannot be completed by Summer or Extra Session.

(11) English Concentration and Major

First Year: English 100.

Second Year: English 201 (students with credit in B.C. Literature 12 may substitute three units from English 202-208,

Third and Fourth Years:

Concentration: A minimum of twelve units, with at least three units from each of categories (a), (b), (c) and (d) below.

Major: A minimum of eighteen units, with at least three units from each of categories (a), (b), (c), and (d) below.

(a) Studies in the English language: English 320-329, 340, 345; Lingustics 420.

(b) Studies in Written Composition: English 303 or 304, or Creative Writing 301.

(c) Studies in Early Literary Periods: English 318, 350-399, 431, 434.

(d) Studies in Modern Literary Periods: English 400-430, 432, 433, 435-446

Notes:

(1) Recommended electives: Creative Writing 202; English Education 335, 337 338, 340, 341, 349, 478, 489; Reading Education 472, 474; Women's Studies 224.

(2) Prospective English teachers are advised to include both Shakespeare and Canadian literature in their programs. Students may also select from English 310-319, 330-339, or 450. Honours students may substitute English 480-497 where appropriate in categories (c) and (d) above.

(3) Students are encouraged to take additional courses in composition and rhetoric: English 301, 302, 306, 307; Creative writing 403.

(12) French Concentration and Major

First and Second Years: French 120 (or equivalent), 202 and 220 (either of these may be taken in the Third Year).

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Third and Fourth Years:

Concentration

French 302 (with at least second class standing); at least 6 additional units in courses numbered 300 and above (excluding 301, 303, 308, 320, 323, 400, 401 and 403).

Major

French 302 (with at least second class standing); at least 12 additional units in courses numbered 300 and above (excluding 301, 303, 308, 320, 323, 400, 401 and 403).

Recommended, in both the concentration and major: French 306, 402, a course in linguistics and Communications Media and Technology 414, chosen as a professional elective.

(13) German Concentration

For students wishing a concentration in German and a second language, other than English, French is strongly recommended.

First and Second Years: German 123 and 223.

Senior Years: German 323; German 310 or 350; 3 units from German 402, 403, 404, 405, 406, 407, 408, 409, 410, or 423.

German 223 and 323 may be taken as 233/333 in the second year. Other combinations are also possible.

Note: Election of the course in German civilization (Germanic Studies 301) is strongly advised and work in another language, or linguistics is recommended.

This concentration cannot be completed entirely by Summer or Extra Session.

(14) Home Economics Concentration and Major

First Year: Home Economics 100; Chemistry 103 or 110 or 120.

Second Year: Home Economics 220; Chemistry 230 or 203.

Concentration

Third Year: Home Economics 240.

Third and Fourth Years: Home Economics 201, 203, 352, 354, and 360.

Major

Third Year: Home Economics 240; Economics 309 or 100.

Third or Fourth Years: Home Economics 201, 203, 352, 354, and 360.

Fourth Year: Home Economics 364.

Recommended Electives: Home Economics 205, 301, 312, 322, 340, 342, 364, 404, 414, 452, 454, or 456. It is strongly recommended that students choosing the concentration take either Economics 100 or Economic 309.

Note: Only 3 units of English at the 200-level or 303 need be taken with either the concentration or major.

(15) Industrial Education Major

(The requirements for this major are being revised. Interested students should consult the Teacher Education Office.)

(16) Italian Concentration

For students wishing to complete a concentration in Italian and in a second language, other than English, French is strongly recommended.

First and Second Years: Italian 100 and 200, or 120 and 220, or 105.

Third and Fourth Years: Italian 302 or 400; and 6 units in Italian courses numbered 300 or higher.

This concentration cannot be completed entirely by Summer or Extra Session.

(17) Japanese Concentration

First and Second Years: Japanese 100, 101, and 200. Recommended: Japanese 201.

Third and Fourth Years: Japanese 300, 301 and 400.

This concentration cannot be completed entirely by Summer or Extra Session.

(18) Mathematics Concentration and Major

First and Second Years: Mathematics 100, 101, 200, 205, 220, 221; and Computer Science 114 and 116. In addition, one of Physics 110, 115, or 120 is recommended.

It is possible that the choice of a particular second concentration may require the student to register for more than 15 units in one or more of the first two years.

Third and Fourth Years:

Concentration

Mathematics 307, 310, 311 and at least 1½ units from Mathematics 302, 303, 315, 316, 322, 340, 345, 413, 445, or Statistics 305 or 306.

Major

Mathematics 302, 303, 307, 310, 311, 315; Statistics 305 and 306; and at least 3 units from Mathematics 316, 318, 322, 340, 345, 413, 445, 480, Computer Science 302, 402 and 403.

(19) Music Concentration and Major

Concentration

Prerequisite: Previous music training satisfactory to the Faculty of Education.

First and Second Years: Music Education 101, 102 and 201.

Students must obtain at least a second class in Music Education 101 and in 201 to be considered for a Music Education concentration.

Senior Years: Music Education 302, 303, and 401.

Strongly recommmended: Two of Music 102, 112, and 122.

Major

First Year: English 100, Music 100, 101, 120, 121, 171 (or 141), 182, and one large ensemble; Music Education 103; 3 units of first or second year Arts or Science electives.

Second Year: Educational Studies 200; 3 units of 200-level English; Music 200, 201, 220, 221, 271 (or 241), 282, one large ensemble, and one of Music 102, 112, or 122.

Third Year: Education 298; Educational Psychology 301, and 302; Music 300, 301, 306, 371, 382, one large ensemble, and one of Music 102, 112, or 122; 3 units of Arts or Science electives.

Fourth Year: Education 498; Educational Psychology 332 or Psychology 301; Music 471, 482, one large ensemble, one small ensemble, and one of Music 102, 112, 122, or Music Education 303; 3 units of Arts or Science electives; 3 units of Education or Music electives*.

Fifth Year: Education 499; one of Educational Studies 400, 407, 430, or 470; Music Education 302, 401, 404; 3 units of Education electives; 3 units of Education or Music electives*.

*Students will register in Year One to Year Three in the Bachelor of Music program. In Year Four and Year Five students proceeding to the B.Ed. (Secondary) with a Music major will choose Education electives (from list for Year 5 of B.Ed.-Secondary), while students proceeding to the Bachelor of Music in Secondary Music Education will choose Music electives.

Note: These programs cannot be completed entirely by Summer or Extra Session.

(20) Physical Education Concentration

First and Second Years: Physical Education 161, 164, 202, 203, 218, 230, 240, 262, and two 200-level Physical Education performance electives of which one must be a team game. (Students who demonstrate a satisfactory standard in swimming may be exempted Physical Education 230.)

Third and Fourth Years: Physical Education 361, 368, 369, and 460; three units of senior electives from Physical Education theory courses, Recreation 394, or Education 306. (Recommended theory courses: Physical Education 362, 364, 365, 384, and 462.)

(21) Physics Concentration and Major

Concentration

First and Second Years: Physics 110, 115, or 120; Physics 213 (2) and 215 (2); Mathematics 100, 101, 200, and 221; Chemistry 103, 110, or 120.

Senior Years: Physics 311, 319, 326, and 3 additional units of approved senior physics courses; (Physics 412 is strongly recommended.)

Note: Only 3 units of English at the 200-level or 303 need be taken.

Geology 105 is strongly recommended. Physics 230 is strongly recommended and may be taken in the Second, Third or Fourth Year. Mathematics 315 is prerequisite to Physics 412.

Major

First and Second Years: Physics 110, 115, or 120; Physics 213 and 215; Mathematics 100, 101, 200, and 221; Chemistry 103 or 110 or 120; Biology 101 or 102.

Senior Years: Geology 105; Mathematics 315; Physics 311, 319, 326, 412, and 7½ additional units of approved senior physics courses.

Physics 230 is strongly recommended and may be taken in the Second, Third or Fourth Year.

Note: Only 3 units of English at the 200-level or 303 need be taken.

(22) Russian Concentration

For students wishing to complete concentrations in Russian and a second language, other than English, French is strongly recommended.

First and Second Years: Russian 100 and 200 *or* 110.

Third and Fourth Years: at least 9 units from Russian 300, 305, 315, and 400.

Russian 303 and a course in modern Russian literature are recommended as additional electives.

This concentration cannot be completed entirely by Summer or Extra Session.

(23) Social Studies (Emphasis on geography) Concentration and Major

First and Second Years:

(a) 6 units of geography, including 3 units from Geography 103, 200, and 201, and 3 units from Geography 101, 212, and 213.

(b) 3 units of first or second year history.

(c) 3 units of first or second year anthropology, Asian area studies, classical studies, economics, history, history of fine arts, history of music, philosophy, political science, Slavonic area studies, sociology, or urban studies.

Third and Fourth Years:

Concentration

9 units of third and fourth year geography which shall include Geography 320, 350, and 366.

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Major

15 units of third and fourth year geography as follows:

(a) Geography 320, 350, and 366;

(b) 3 units from the technique courses;

(c) 7½ units from one of the following streams: Cultural/Historical, Economic, Environmental, and Urban. At least 3 of these units must be at the 400-level.

Notes:

(1) In the total program at least 3 units of geography must have an emphasis on Canada.

(2) Students are advised to elect an additional 3 units of senior courses in anthropology, Asian area studies, classical studies, economics, history, history of fine arts, history of music, philosophy, political science, Slavonic area studies, sociology, or urban studies.

(3) Students are strongly urged to complete a program that will prepare them for the wide range of geographical topics dealt with in secondary schools.

(4) Students combining this concentration with another social studies concentration should know that prerequisite courses may satisfy some junior requirements in both concentrations.

(24) Social Studies (Emphasis on history) Concentration and Major

First and Second Years:

(a) 6 units of first or second year history or medieval studies.

(b) 3 units of first or second year geography.

(c) 3 units of first or second year anthropology, Asian area studies, classical studies, economics, geography, history of fine arts, history of music, philosophy, political science, Slavonic area studies, sociology, or urban studies.

Third and Fourth Years:

Concentration

9 units of third and fourth year history, of which not more than six may be in the same field or area.

Major

15 units of third and fourth year history chosen in consultation with a departmental adviser.

Notes:

(1) In the total program at least 3 units of history must have an emphasis on Canada.

(2) Students are advised to elect an additional 3 units senior anthropology, Asian area studies, classical studies, economics, geography, history of fine arts, history of music, philosophy, political science, Slavonic area studies, sociology, or urban studies.

(3) Students are strongly urged to complete a program that will prepare them for the wide range of historical topics dealt with in secondary schools.

(4) Students combining this concentration with another social studies concentration should know that prerequisite courses may satisfy some junior requirements in both concentrations.

(25) Social Studies Concentration (Emphasis on social sciences)

It is recommended that students electing this concentration accompany it by number 5 — Canadian studies concentration or number 23 — social studies concentration (emphasis on geography), or number 24 — social studies concentration (emphasis on history).

First and Second Years:

(a) 6 units of first or second year course work in the department of the social science concentration (anthropology, Asian studies, economics, sociology or political science).

(b) 3 units of first or second year history.

(c) 3 units of first or second year geography.

Third and Fourth Years:

9 units of third and fourth year course work in the department of the concentration (anthropology, sociology, economics, political science, or Asian area studies) appropriate to the secondary school social studies program. This course work should be chosen in consultation with a departmental adviser.

Notes:

(1) In the total program at least 3 units, from the department of the concentration if possible, must have an emphasis on Canada.

(2) Students are advised to select an additional 3 units of senior course work in history or geography.

(3) Students combining this concentration with another social studies concentration should know that pre-requisite courses may satisfy some junior requirements of both concentrations.

(26) Spanish Concentration

For students wishing to complete a concentration in Spanish and a second language, other than English, French is strongly recommended.

First and Second Years: Spanish 105, or 100 and 200. Spanish 205 is recommended.

Third and Fourth Years: Spanish 300; six units in Spanish courses numbered above 300, not including 305, 311, or 403.

This concentration cannot be completed entirely by Summer or Extra Session.

(27) Theatre Concentration

First Year: Theatre 120.

Second Year: Theatre 200.

Third Year: Theatre 310 or 320, and 350.

Fourth Year: Theatre 400.

This concentration cannot be completed entirely by Summer or Extra Session.

Recommended: 3-6 additional units of theatre courses.

2. Programs in Secondary Education for Graduates

(a) The One-Year Program (Secondary) for Graduates of Faculties other than Education

Students will complete an individually prescribed program as follows:

	Units
Educational Psychology 301 and 302	3
One of Educational Studies 400, 407, 430, or 470	3
Curriculum and instruction courses corresponding to Academic concentrations or major	3-6
4½-7½ units chosen from Adult Education 412; Business Education 410; Computing Studies Education 317, 400, 417; Counselling Psychology 426, 427; Curriculum and Instructional Studies 361, 396**; Education 380, 413, 479; Educational Administration 460; Educational Psychology 332, 401, 428, 434, 435, 461, 462, 481, 482, 483; Educational Studies 400, 407, 430, 468, 470; English Education 337, 338, 349, 416, 478, 489; Higher Education 493; Library Education 381, 383, 384, 387, 388, 389; Mathematics Education 471, 485, 488; Modern Languages Education 394; Reading Education 472, 474; Special Education 312, 313, 314, 316, 317, 318, 403, 408, 418, 423, 429, 431, 436, 437	4½-7½
*Education 499 (Seminar and in-term and post-sessional practical	0
Total	Minimum of 15 Maximum of 18†

*Education 499 is weighted one-third in determining overall standing in this program. Students are recommended for certification only after achieving satisfactory standing both in student teaching and in the professional courses.

**Maximum of three units.

†When required or permitted by the Director and Head of the Department, an Education 440 may be included as part of a program of 16½ (or more) units.

(b) A fifth year for students holding a B.Ed. (Elementary) Degree.

Completion of this program does not lead to the granting of a Bachelor of Education (Secondary) Degree.

Graduates of the four-year program in Elementary Education may undertake a fifth year of study in one of three ways: (1) by applying for a qualifying year through the Graduate Studies Office; (2) by applying for admission to the Diploma in Education program through the Registrar's Office; or (3) by planning a program to qualify for teaching in secondary school through the Teacher Education Office.

(c) The Industrial Education Program for holders of an undergraduate degree

The requirements for this major are being revised. Interested students should consult the Teacher Education Office.

C. OPTIONAL PROFESSIONAL PROGRAMS

The Faculty has offered a number of optional programs which satisfy the third year requirements of the B.Ed. (Elementary) program and/or the fifth year of the B.Ed. (Secondary) program and/or the One-Year Program for Graduates of Faculties other than Education (Elementary or Secondary). The optional programs differ in the type of student who is admissible to the program, their emphases in the amount and type of student teaching, and in the scheduling of lectures. Not all programs are offered every year; information concerning the programs currently offered may be obtained from the Teacher Education Office.

D. FIVE-YEAR MAJOR IN SPECIAL EDUCATION B.Ed. (Special Education)

Note: *The Faculty of Education is proposing to revise its undergraduate degree programs. Interested persons should consult the Faculty for information about the potential revision of admission and program requirements.*

In anticipation of this revision, no students will be admitted in 1986 to the first year of the B.Ed. (Special Education). Students should seek initial admission to other degree programs.

This program prepares teachers to educate mildly handicapped children (mildly intellectually impaired, behaviourally disordered and learning disabled).

There is a limited number of places in each year of this program. In most years it is likely that the number of qualified applicants will exceed the number of places. In the selection of candidates for admission, the following guidelines are observed: (1)

no discrimination is made with respect to sex, race, religion, marital status, or economic status of the applicant; (2) preference is given to residents of British Columbia who are Canadian citizens or landed immigrants; (3) selection of candidates for admission is made by a consensus of the Admissions Committee, taking into account: (a) the candidate's total academic record, (b) recommendations by two referees selected by the candidate and submitted under confidential cover, (c) evaluation of non-academic autobiographical material supplied by the applicant in the application documents. Non-academic factors to which special attention is paid include motivation, maturity, personal suitability, and experience with handicapped children. An interview may be required.

All applications must be received not later than May 31 and all supporting documents by June 15.

Field Experiences

Field experiences in Special Education are viewed as an integrated part of the total program. They are planned to increase in intensity and responsibility as the student progresses through the professional program. The student will have a series of practicum experiences with both normal and atypical children.

Second Year	Education 297	Observation, recording behaviour, classroom experience with individuals and groups.
Third Year	Education 397	Student Teaching. One practicum in May in a special education setting.
Fourth Year	Education 497	Student Teaching. Two practica in-term with elementary students. One practicum in May with atypical students.
Fifth Year	Special Education 342	Field experiences with chosen individual atypical children.
	Special Education 347	Field experiences with groups of atypical children.

First Year	**Units**
English 100	3
A first year laboratory science (Biology 101 or 102 recommended)	3
Psychology 100	3
Academic elective, normally at the 100 or 200 level	3
Anthropology/Sociology 100	3
	15

Second Year	**Units**
English at the 200-level	3
Psychology 200	3
Academic Electives (Sociology 200 or 230 suggested)	6
Reading Education 305	3
Educational Psychology 310	1½
Special Education 312	1½
Education 297	0
	18

Third Year	**Units**
9 units in Psychology, chosen from 300, 301, 304, 309, 313, 316, 401, or 414,	
or	
9 units in Anthropology, chosen from 301, 304, 316, 329, 401, 413, 417, or 430,	
or	
9 units in Sociology, chosen from 354, 356, 361, 368, 473, 477, or 480	9
Education of Young Children 303 or English Education 304	3
Social Studies Education 322	1½
Special Education 316*	1½
Special Education 429*	1½
Special Education 431*	1½
Education 397	0
	18

Fourth Year	**Units**
Educational Studies 400, 407, 430, or 470	3
Mathematics Education 369	3
Academic or professional electives	3
Term I	
Art Education 323	1
Special Education 315	1½
Special Education 436*	1½
Term II	
Educational Psychology 311	1½
Special Education 437*	1½
Education 497**	0
	16

Fifth Year	**Units**
Term I	
Science Education 321	1½
Special Education 343*	1½
Special Education 344*	1½
Special Education 348*	1½
Educational Psychology 461*	1½
Term II	
Special Education 342*	1½
Special Education 345*	1½
Special Education 347*	1½
Select 3 units from: Education 479; Educational Psychology 481, 482, 483; English Education 478; Mathematics Education 471; Music Education 324; Physical Education 362, 467, 468; Special Education 313, 314, 317, 318, 346, 403, 406, 408, 418, 419, 423, 424 or 434	3
	15

*These courses constitute the major in the program.

**Education 497 is weighted one-third in determining overall standing in the degree program.

VI. THE DIPLOMA IN EDUCATION

The Faculty of Education offers a Diploma Program with several fields of specialization within educational theory and practice. The program provides structured sequences of academic and professional studies for teachers and others working in educational or instructional settings. Elementary teachers holding four-year degrees may take the program as a fifth year either to enhance their existing area of professional speciality or to develop a further one. For teachers who have already completed five years of recognized academic and professional studies, the program provides an opportunity to develop an additional area of professional competence. Most programs can, if desired, be planned to incorporate prerequisites for admission to a Master's program.

A Diploma in Education indicating the field of specialization will be awarded upon successful completion of an approved program of study.

1. Admission

Except for designated specializations, admission to the Diploma in Education normally requires an acceptable bachelor's degree or equivalent. Certain fields of specialization are open only to qualified and experienced teachers, and some have specific course prerequisites. Detailed information is contained in "The Diploma in Education: A Handbook," available from the Teacher Education Office, Faculty of Education, or from the relevant departmental offices.

2. Requirements for the Diploma in Education

The Diploma requires the completion of 15 units of courses numbered 300 or above with an average of 65% or higher. In most specializations 6–9 units of course work are designated as core requirements, while 6–9 units may be selected from approved supporting or related courses. A maximum of 9 units of appropriate courses completed at UBC previously and not credited towards the requirements of any other degree, diploma, or teacher certification program may be applied to a diploma program. A maximum of 6 units of approved courses may be completed by guided independent study.

In order to qualify for the Diploma in Education, a student must complete all requirements for the selected specialization within five years. Except in the fields indicated, completion of a diploma program does not satisfy any of the requirements for a B.C. teaching certificate.

3. Reading Requirements and Transfer of Credit

In general there are no residence requirements for the Diploma in Education. In most specialization fields a diploma program may be completed on either a full-time basis over one academic year or on a part-time basis, either on- or off-campus. However, in certain designated fields the program may be completed only by full-time study during a regular winter session. A maximum of 6 units of approved credit may be transferred from other institutions towards the requirements of a Diploma in Education.

4. Fields of Specialization

*** Adult Education**
Art Education
Business Education
Computing Studies Education

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Curriculum and Instructional Studies
** **Education of the Deaf**
** **Education of the Mentally Retarded**
** **Education of Visually Impaired Children**
Education of Young Children
English Education
English as a Second Language
French Education
Guidance Studies
Industrial Education
Library Education
Mathematics Education
Mathematics and Science Education
Multicultural and Minority Education
Music Education
Physical Education
Reading Education
Science Education
Special Education
Values Education
Visual and Performing Arts in Education

NOTES:

* Some non-graduates may be admitted in this field.

** Full-time study during a regular winter session is required. Completion of a program in this field requires extensive practica and partially satisfies requirements for a British Columbia teaching certificate. Enrollment is limited; interested applicants should apply early as the selection of applicants is normally completed by March 1.

VII. GRADUATE PROGRAMS IN EDUCATION

Admission to all courses leading to a graduate degree (M.A., M.Ed., Ed.D., Ph.D.) require registration with the Faculty of Graduate Studies and full approval of the Faculty of Education. Application forms are available from the Office of Graduate Programs and Research in the Faculty of Education and are to be accompanied by complete official transcripts of the applicant's academic and professional record to date. If the application is accepted the applicant will be referred to the appropriate program adviser within the Department offering the program to gain approval for a planned sequence of courses. The student will be under the guidance of an adviser to whom a regular report on progress must be made. All changes in program must receive approval of the adviser and be reported to the Department Office.

Applicants for admission to graduate programs are strongly advised to submit their applications before May 1. Deadlines for applications are June 30 for the following Winter Session and April 1 for the following Summer Session.

Students admitted before February 1 may be considered for a University Fellowship. The deadline for application for graduate assistantships is May 1.

Specific Requirements: M.A., M.Ed., Ed.D., Ph.D. Degrees

See Faculty of Graduate Studies Section of Calendar.

1986-87

THE SCHOOL OF FAMILY AND NUTRITIONAL SCIENCES

(A School within the Faculty of Arts)

ACADEMIC STAFF

ROY H. RODGERS, B.A. (Wheaton College, Illinois), M.A. (N. Carolina), Ph.D. (Minnesota), Professor and Director of the School.

Professors

INDRAJIT D. DESAI, I.D.D. (Govt. of India), B.Sc., M.Sc. (Gujarat), Ph.D. (Calif., Davis)
MELVIN LEE, B.A. (Calif., L.A.), M.A., Ph.D. (Calif., Berkeley).
JOSEPH LEICHTER, B.S. (Cracow College, Poland), M.S., Ph.D. (Calif., Berkeley).
DANIEL PERLMAN, A.B. (Bard College), M.A., Ph.D. (Claremont Graduate School).

Associate Professor

MARGARET ARCUS, B.Sc. (Nebraska), M.Ed. (Utah State), Ph.D. (Iowa State).
NANCY E. SCHWARTZ, B.H.E. (Brit. Col.), Ph.D. (Ohio State).
JOANNA STANISZKIS, B.F.A. (Art Institute of Chicago), R.C.A.

Assistant Professors

SUSAN BARR, B.H.E. (Brit. Col.), Ph.D. (Minnesota).
PHYLLIS J. JOHNSON, B.S., M.S. (Kansas State), Ph.D. (Ohio State).
CAROL L. MARTIN, B.A. (Georgia), M.S. (Rutgers), Ph.D. (Georgia).
ELEANORE R. VAINES, B.Sc. (Washington), M.S. (Cornell), Ph.D. (Michigan State).
JAMES WHITE, B.A. (Colorado College), M.A. (Calgary), Ph.D. (Alberta).

Instructor

CLARE N. DAEM, B.H.E. (Brit. Col.).

Part-time Lecturers

ARLEE B. GALE, B.H.E. (Brit. Col.), M.S. (Cornell).
SANDRA L. HOMENUK, B.H.E. (Brit. Col.).
CECELIA F. PODOLAK, B.A. (Northern Iowa), M.S. (Oklahoma State).

Lecturer from another Department

PETER HAHN, B.Sc. (Swansea), M.D., C.Sc., D.Sc., (Prague), Professor, Dept. of Obstetrics and Gynaecology.

Honorary Lecturer

CHRISTINE SAMSON, B.Sc. (Acadia), R.D.T. (Alta.).

Honorary Clinical Instructors from Affiliated Institutions

Cancer Control Agency of B.C.	— Violaine Sauve, B.Sc. (Ottawa).
Children's Hospital	— Carol L. Ireton, B.H.E. (Brit. Col.), M.S. (Pennsylvania State). Margaret C. Jessome, B.Sc. (Ottawa). Patricia J. Thomson, B.Sc. (Brit. Col.).
Health Sciences Centre Hospital	— Susan E. Ross, B.H.E., M.Sc. (Brit. Col.). Verna Magee Sheperd, B.H.E. (Brit. Col.), M.Sc. (Calgary).
Shaughnessy Hospital	— Mary Lou Stem, B.A.Sc. (Guelph).
Vancouver General Hospital	— Joan Donegani, B.Sc.H.Ec. (Manit.), M.Sc. (Iowa State). Florence M. Wilson, B.Sc. (Sask.).

THE SCHOOL OF FAMILY AND NUTRITIONAL SCIENCES

Statement of Purpose

The School of Family and Nutritional Sciences has a two-fold function; first, to educate for professional competence and second, to encourage a spirit of intellectual enquiry.

The School, through the Division of Family Sciences and the Division of Human Nutrition, offers five undergraduate programs: (1) General Home Economics, (2) Family Sciences, (3) Human Nutrition, (4) Dietetics, and (5) Human Nutrition Honours; and graduate programs in Human Nutrition and Family Science. In each area the subjects are interrelated with the arts, humanities, social, physical and biological sciences. The Human Nutrition, Dietetics and the Honours Nutrition programs involve concentration in the physical and biological sciences. The General Program involves broad exposure to all areas of Home Economics and the choice of appropriate electives in supporting disciplines. Provision for part-time study may be made by application to the Director.

Professional Opportunities

Home Economics as a profession is concerned with the ways in which it can benefit both the individual and the family. Graduates of the General Program may be employed in teaching. Graduates of the Family Sciences Program may be employed in extension services, community agencies, and business and industry. Graduates of the Dietetics Program may apply for a one-year Graduate Dietetic Internship in any province in Canada following graduation, in order to qualify as professional dietitians. Graduates of the Honours program most often will pursue advanced degrees leading to positions in university teaching, research, nutrition services, or international food and nutrition organizations.

Dietetic Qualification Study

Graduates holding a Bachelor's Degree in Science, Food Science, or Home Economics may undertake additional study in the School of Family and Nutritional Sciences to qualify for application to a Dietetic Internship Program (not available in universities). Completion of this study does not lead to a degree in Dietetics and does not guarantee placement in an Internship Program. Interested students should consult a Dietetics Adviser in the School.

BACHELOR OF HOME ECONOMICS — B.H.E.

Admission

British Columbia secondary-school graduates with an average grade of C+ (or better) based on the general University Admission requirements set out in the General Information section of this Calendar, and the specific subjects indicated below, will be considered for admission in order of their academic performance. Applicants will be selected on the basis of their secondary school records and of a general assessment of their capacity for success in university studies as made by the Admissions Committee.

A student who has completed appropriate studies with satisfactory standing beyond Grade 12 may be considered for admission and the granting of advance credit. Credit on transfer from a B.C. college is restricted to First and Second Year level university studies.

A student presenting documents issued by educational institutions outside the province of British Columbia must submit a $25 fee with the Application for Admission form.

The University reserves the right to reject applicants for admission on the basis of their overall academic records even if they technically meet entrance requirements and to limit enrolment if its facilities and resources are inadequate.

Academic Regulations—See Faculty of Arts and General Information sections of the calendar.

I. A minimum total of 24 units is required of courses in Family and Nutritional Sciences (FNSC).
II. In the third and fourth years a student must earn at least twenty-four units in courses numbered 300 or above.
III. Minimum number of units required for the B.H.E. degree is 60 units.
IV. To qualify for the degree of Bachelor of Home Economics (B.H.E.) students must satisfy the English Composition requirement of the School of Family and Nutritional Sciences. To do this, students must obtain credit for English 100 and must pass the English Composition Test (ECT). Each student must attach a fee sticker to the ECT booklet. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services. Students will not be admitted to the third year of the program in Family and Nutritional Sciences until they have satisfied the English Composition requirement. The exception to this rule is that students transferring into third year from other institutions may be admitted but must fulfil the requirement within one academic year. Students who have obtained credit for English 100 but have not passed the Composition test will write it in late September. The test is also given during the December Examination period, in late March or April, and in July.

DIVISION OF FAMILY SCIENCES

Entrance Requirements from Secondary School Program:
Algebra (Mathematics) 11; Chemistry 11.
Recommended: Algebra (Mathematics) 12; Physics 11, Biology 11, and as many Home Economics courses at the "11" and "12" level as possible.

First Year	Units	Second Year	Units
English 100	3	Chemistry 230	3
Biology 101 or 102	3	Economics 100	3
Chemistry 103	3	FNSC 200	1½
***Mathematics 130 (or Social Science if Algebra 12 done)	3	FNSC 210	3
FNSC 100 and 101	3	FNSC 220	3
		FNSC 240	1½
	15		15

Family Sciences Major Program

Third and Fourth Year	Units
Human Development Option	1½
Family Option	1½
FNSC 400	1½
Chosen from Subject Matter Options*	9
13½ units required	
**16½ units free electives	
Total: 30 Units Third and Fourth Year	

General Home Economics Major Program

Third and Fourth Year	Units
FNSC 201	3
FNSC 203	1½
FNSC 205	1½
FNSC 340	1½
FNSC 352	1½
FNSC 354	1½
FNSC 360	1½
FNSC 400	1½
FNSC 454 or 456	1½
15 units required	
**15 units free electives	
Total: 30 Units Third and Fourth Year	

DIVISION OF HUMAN NUTRITION

Entrance Requirements from Secondary School Program:
Algebra (Mathematics) 12; Chemistry 11; Physics 11.
Recommended: Chemistry 12, Biology 11, and as many Home Economics courses at the "11" and "12" level as possible.

First Year	Units	Second Year	Units
Chemistry 110 or 120	3	Chemistry 230	3
Mathematics 100	1½	Microbiology 200	3
Mathematics 101	1½	FNSC 200	1½
English 100	3	FNSC 201	3
Biology 101 or 102	3	FNSC 211	1½
Physics 110	3	Biology 200	1½
		Biology 201	1½
	15		15

Human Nutrition Major Program

Third Year	Units	Fourth Year	Units
Biochemistry 301	1½	**Advanced Foods 401	1½
Biochemistry 302	1½	**FNSC 403	1½
**Statistics	1½	**FNSC 411	1½
Physiology 301 or Zoology 303	3	**Electives	10½
FNSC 305	1½		
FNSC 307	1½		
**Electives	4½		
	15		15

Dietetics Major Program

Third Year	Units	Fourth Year	Units
Biochemistry 301	1½	**Advanced Foods	1½
Biochemistry 302	1½	**FNSC 407	3
**Statistics	1½	**FNSC 411	1½
Physiology 301 or Zoology 303	3	**FNSC 421	3
**Commerce (Bus. Admin.)	1½	**Electives	6
FNSC 305	1½		
FNSC 307	1½		
**Social Science Elective	3		
	15		15

Human Nutrition Honours Program

Third Year	Units	Fourth Year	Units
Biochemistry 301	1½	**Advanced Foods	1½
Biochemistry 302	1½	**FNSC 403	1½
**Statistics	1½	**FNSC 411	1½
Physiology 301	3	**FNSC 449	3
Chemistry 205 or 330	3	**Electives	10½
FNSC 305	1½		
FNSC 307	1½		
**Electives	4½		
	18		18

Notes:
* Subject Matter Options include: 1. Family/Human Development; 2. Family Resources Management; 3. Foods and Nutrition; 4. Housing and Design; 5. Clothing and Textiles.
** Students may elect courses not only from the Faculty of Arts, but from other Faculties, such as Commerce or Science. Specific courses are to be chosen in consultation with adviser.
*** Students who have not had Algebra 12 must take Mathematics 130. **In this case, a Social Science must be taken in the Third Year.** Social Science electives may be chosen from the following disciplines: anthropology, political science, psychology, sociology.

FIVE YEAR PROGRAM FOR B.ED. DEGREE (SECONDARY FIELD)

First Year
FNSC 100, Chemistry 103 (or 110 or 120).

Second Year
FNSC 220, Chemistry 230 (or 203).

Concentration in Home Economics

Third Year
FNSC 240

Third and Fourth Years
FNSC 201, 203, 352, 354, 360.
Economics 100 or 309 is strongly recommended for students choosing the Concentration.

Major in Home Economics

Third Year
FNSC 240, Economics 309 (or 100).

Third and Fourth Years
FNSC 201, 203, 352, 354, 360.

Fourth Year
FNSC 364.

Recommended Electives
FNSC 205, 301, 312, 322, 340, 342, 364, 404, 414, 452, 454, 456.

Students transferring from the Bachelor of Education program to the Bachelor of Home Economics program will be required to complete all requirements and prerequisites of the Bachelor of Home Economics program.

GRADUATE STUDY — MASTER'S DEGREES AND DOCTORATE

The Divisions of Human Nutrition and of Family Science offer opportunities for advanced study. The M.Sc. and Ph.D. programs in Human Nutrition and the M.A. program in Family Studies are described more fully in the Faculty of Graduate Studies section of the Calendar.

1986-87

THE FACULTY OF FORESTRY

ACADEMIC STAFF

Office of the Dean

ROBERT W. KENNEDY, B.S. (State Univ. of New York), M.F. (Brit. Col.), Ph.D. (Yale), F.I.A.W.S., F.I.W.Sc., Professor in Harvesting and Wood Science and Dean of the Faculty.
ANTAL KOZAK, B.S.F. (Sopron), M.F., Ph.D. (Brit. Col.), Professor in Forest Resources Management and Associate Dean of the Faculty.
DONALD D. MUNRO, B.S.F. (Brit. Col.), M.S. (Oregon State), Ph.D. (Brit. Col.), R.P.F., Professor in Forest Resources Management, Director Off-Campus Programs, and Director of University Research Forest.
JACK W. WILSON, M.S., Ph.D. (N.Y. State), Professor in Harvesting and Wood Science and Director of Forestry Graduate Studies Program.
LEONID VALG, B.S.F., M.F. (Brit. Col.), Assistant Professor in Harvesting and Wood Science and Admissions Officer.

Department of Forest Resources Management

Professor and Head
J. HARRY G. SMITH, B.S.F. (Brit. Col.), M.F., Ph.D. (Yale), R.P.F.

Professors
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PETER H. PEARSE, B.S.F. (Brit. Col.), M.A., Ph.D. (Edinburgh), R.P.F.
F. LESLIE C. REED, B.A. (Portland), M.A. (Oregon), NSERC/Industrial professor of Forest Policy.
J. VINCENT THIRGOOD, B.Sc. (Forestry) (Botany) (Wales), M.F. (Oregon State), M.F. (Brit. Col.), Ph.D. (State Univ. of New York), Ph.D. (Syracuse), R.P.F.

Associate Professors
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JULIEN P. DEMAERSCHALK, B.S.F. (Louvain), M.F., Ph.D. (Brit. Col.).
PETER J. DOOLING, B.A., B.P.E., M.A. (Alta.), Ph.D. (Colorado State).
DOUGLAS L. GOLDING, B.Sc. (New Brunswick), M.S. (Purdue), Ph.D. (Brit. Col.), R.P.F.
DAVID HALEY, B.Sc. (Aberdeen), M.F., Ph.D. (Brit. Col.), R.P.F.
ROBERT J. WOODHAM, B.A. (W.Ont.), M.S., Ph.D. (M.I.T.)

Assistant Professors
PETER L. MARSHALL, B.Sc.F., M.Sc.F. (Toronto), Ph.D. (Brit. Col.)
PAT A. MILLER, B.S.L.A. (Cal. St. Poly., U. Pomona), M.L.A. (Berkeley), Ph.D. (Mich.), B.C.S.L.A. and C.S.L.A.

Lecturers
PETER R. W. SANDERS, B.S.F., M.F. (Brit. Col.), R.P.F. Part-time.
ROY J. VAN RYSWK, B.A.Sc. (Brit. Col.), M.Sc. (Illinois), Part-time.

Adjunct Professors
G. MICHAEL BONNOR, B.S.F., M.S.F. (Toronto) Ph.D. (State Univ. of N.Y.).
THOMAS H. HALL, B.A., M.Sc. (Indiana), M.Sc.F. (N. Brunswick), Ph.D. (Brit. Col.), R.P.F.
KENNETH J. MITCHELL, B.S.F. (Brit. Col.), M.F., Ph.D. (Yale), R.P.F.
DOUGLAS H. WILLIAMS, B.Sc. (Simon Fraser), M.Sc., Ph.D. (Brit. Col.).

Honorary Lecturers
JOHN G. BENE, B.Sc. (Budapest).
FRANK HEGYI, B.Sc.F. (Edinburgh), M.Sc.F. (Toronto), R.P.F.
WILLIAM YOUNG, B.S.F. (Brit. Col.), R.P.F.

Department of Forest Sciences

Professor and Head
DENIS P. LAVENDER, B.Sc. (Washington), M.Sc., Ph.D. (Oregon State).

Professors
FREDERICK L. BUNNELL, B.S.F., (Brit. Col.), Ph.D. (Calif.).
JAMES P. KIMMINS, B.Sc. (Bangor), M.S. (Calif.), M.Phil., Ph.D. (Yale).
THOMAS G. NORTHCOTE, M.A., Ph.D. (Brit. Col.).
OSCAR SZIKLAI, Dipl. For. Eng. (Budapest-Sopron), M.F., Ph.D. (Brit. Col.), R.P.F.
GORDON F. WEETMAN, B.Sc.F. (Toronto), M.F., Ph.D. (Yale), R.P.F.

Associate Professors
JOHN McLEAN, M.Sc. (Auckland), Ph.D. (Simon Fraser).
BART J. VAN DER KAMP, B.S.F. (Brit. Col.), Ph.D. (Aberdeen).
JOHN G. WORRALL, B.Sc. (Durham), B.S.F. (Brit. Col.), M.F., M.Phil., Ph.D. (Yale).

Assistant Professor
MICHAEL C. FELLER, B.Sc., M.Sc. (Melbourne), Ph.D. (Brit. Col.).

Lecturer
DALE R. SEIP, B.Sc. (West. Ont.), M.Sc. (Simon Fraser), Ph.D. (Brit. Col.).

Adjunct Professors
JOHN E. BARKER, B.Sc. (Brit. Col.), M.Sc., Ph.D. (Calif.).
RALPH C. BOWER, M.S. (S. Illinois), Ph.D. (Texas A & M).
HOLGER BRIX, M.F. (Copenhagen), Ph.D. (Texas).
A. NIGEL BURDETT, B.Sc. (Leicester), Ph.D. (Wales).
DAVID GEORGE EDWARDS, B.Sc. (Aberdeen), M.F., Ph.D. (Washington).
YOUSRY A. EL-KASSABY, B.Sc. (Alexandria), M.Sc. (Tanta), Ph.D. (Brit. Col.).
KAREL KLINKA, For. Eng. (Prague), Ph.D. (Brit. Col.), R.P.F., B.C. Forest Service Adjunct Professor of Forest Ecology (full-time).
GORDON E. MILLER, B.Sc., M.Sc., M.P.M., Ph.D. (Simon Fraser).
DUNCAN J. MORRISON, B.S.F., M.Sc. (Brit. Col.), Ph.D. (Cambridge).
JAMES A. ROCHELLE, B.Sc., M.Sc. (Washington State), Ph.D. (Brit. Col.).
ROY F. SHEPHERD, B.S.F. (Brit. Col.), M.Sc., Ph.D. (Minnesota).
G. ALLAN VAN SICKLE, B.Sc., M.Sc. (Brit. Col.), Ph.D. (Pennsylvania State), R.P.F.

Post Doctoral Fellow
KATHERINE L. PARKER, B.A., M.A., Ph.D. (Washington State).

Research Associates
REID E. CARTER, B.Sc., M.Sc. (Brit. Col.).
SUSAN B. WATTS, B.Sc. (N. Wales), M.F., Ph.D. (Brit. Col.), R.P.F.

Department of Harvesting and Wood Science

Professor and Head
J. DAVID BARRETT, B.A.Sc. (Brit. Col.), Ph.D. (Berkeley), F.I.A.W.S., P.Eng.

Professors
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LASZLO PASZNER, B.S.F. (Sopron), M.F., Ph.D. (Brit. Col.).
JACK W. WILSON, M.S., Ph.D. (State Univ. of New York).

Associate Professor
G. GLENDON YOUNG, B.A.Sc., M.A.Sc. (Brit. Col.), P.Eng.

Assistant Professors
ANDREW F. HOWARD, B.S. (Massachusetts), M.F.S., M.S., Ph.D. (Yale)
DAVID E. N. TAIT, B.Sc., M.Sc., Ph.D. (Brit. Col.).
LEONID VALG, B.S.F., M.F. (Brit. Col.).

Lecturers
DUSAN DODIC, Dip. For. Eng. (Belgrade), M.F. (Brit. Col.), R.P.F. (part-time).
JAMES M. EWART, B.Sc. (Saskatchewan).
G. HARALD LYNUM, B.A.Sc. (Brit. Col.).
PHILIP OAKLEY, B.S.F., M.B.A. (Brit. Col.), R.P.F.

Adjunct Professors
PHILIP L. COTTELL, B.S.F., M.F. (Brit. Col.), Ph.D. (Yale), R.P.F.
ROBERT M. KELLOGG, B.S.F. (Maine), M.Sc., Ph.D. (Yale).
EBERHARD D. KIRBACH, Dipl.-Holzwirt (Hamburg), Ph.D. (Brit. Col.).
JOHN N. R. RUDDICK, B.Sc., M.Sc. (Newcastle-on-Tyne), Ph.D. (Q.E. Col., London).
ROGER S. SMITH, B.Sc., Ph.D. (London).
PAUL R. STEINER, B.Sc., M.Sc., Ph.D. (Brit. Col.).
ERIC P. SWAN, B.A., M.Sc. (Brit. Col.), Ph.D. (McGill).

Research Associates
JOHN D. NELSON, B.S.F., M.B.A. (Brit. Col.).

Honorary Lecturer
G. VERNON WELLBURN, B.A.Sc. (Brit. Col.), R.P.F., P.Eng.

University Research Forest

DUSAN DODIC, Dip. For. Eng. (Belgrade), M.F. (Brit. Col.), R.P.F., Resident Forest Engineer.

PETER R. W. SANDERS, B.S.F., M.F. (Brit. Col.), R.P.F. Resident Silviculturist.

FACULTY OF FORESTRY

Forestry is the science, art, and practice of managing and using wisely the natural resources associated with and derived from, forest lands. These resources include wood products, water, forage, soil and stream productivity, wildlife, recreation, and environmental quality.

The Faculty of Forestry offers four-year degree programs of undergraduate study in:

Forest Resources Management (B.S.F.),
Forest Harvesting (B.S.F.),
Forest Science (B.Sc. - [Forestry]), and
Wood Science and Industry (B.Sc. - [Forestry])

The first two of these are designed to prepare students for entry into the profession of forestry, the last two for careers in specialized fields. Education within the Faculty of Forestry can also serve as a foundation for entry into other professions such as teaching and law. Some students will be interested in Forestry simply as a broad education in an important natural resources field.

Because the standards for admission to most Associations of Professional Foresters involve experience and examination following graduation, and a group of core courses which may not be taken by all students, those students interested in Professional Forestry should design their study plans to satisfy the requirements of the Province in which they plan to register.

Graduate programs are provided through the Faculty of Forestry under the authority of the Faculty of Graduate Studies. The degrees include the following and are designed to enable students who already hold degrees to pursue advanced studies leading to careers in management, research, and education.

M.F. —in professional and applied scientific aspects of Forestry for students with a B.S.F. degree;

M.Sc. —in scientific aspects of forestry and wood science for students with a B.Sc., B.Sc. (Agr.), B.A.Sc., B.S.F. or equivalents;

M.A.Sc. —in Forest Engineering for graduates with a B.A.Sc. degree or equivalent;

Ph.D. —in fields concerned with the basic scientific or economic aspects of forestry and forest products.

Detailed information may be obtained from the Faculty of Graduate Studies section of the calendar.

Environment for Learning

The Faculty of Forestry is favourably situated for education of men and women as foresters, wood scientists, forest business administrators and forest biologists. It enjoys the benefits of a large university with good library and other facilities for study. The teaching staff of the Faculty of Forestry is widely diversified. The Western Laboratory of Forintek Canada Corp. located on campus cooperates in teaching and research in forest products, and the forests of the University Endowment Lands, adjoining the campus, provide a readily accessible environment for field instruction and research.

In addition to the lecture and laboratory classrooms, the Faculty of Forestry has a teaching and research facility embodied in the University of British Columbia Research Forest at Maple Ridge some 64 kilometres distant. This Forest comprises an area of 5,156 hectares where special studies and professional exercises are carried out.

Beyond the formal boundaries of the Faculty of Forestry the province of British Columbia provides, within reasonable travel access, one of the most diversified patterns of biotypes anywhere in the world. Throughout the region many different forest resources management and utilization practices may be observed by students on scheduled field trips or during summer employment.

Forintek Canada Corp.
Canada's National Wood Products Research Organization
Western Division
Vancouver

The Western Division is one of two laboratories of Forintek Canada Corp. which carry out research on forest products. It has been maintained in close association with The University of British Columbia since its establishment in 1918. Excellent facilities and equipment are provided for a wide range of research in timber engineering, plywood, wood anatomy, wood preservation, wood protection, wood chemistry, seasoning, sawmilling, and machining. Currently the total staff complement is 105 of which 75 are scientific and technical personnel.

The Laboratory is located on the Campus and co-operates closely with the Faculty of Forestry by providing research leadership and specialized equipment for graduate research.

B.S.F. and B.Sc. (Forestry)

Admission Requirements

There are two admission pathways to the Faculty of Forestry. One is directly from senior secondary school; the other follows a year of university science at UBC or its equivalent at another post-secondary institution. Apart from the general university entrance requirement (see General Information section of this Calendar) students from Grade 12, British Columbia, are required to have completed satisfactorily Algebra 12, two of Biology 11, Chemistry 11, Physics 11 (all three are strongly recommended) and two of Biology 12, Chemistry 12, Physics 12. Students who present these qualifications will normally be able to complete Forestry degree requirements in four years.

For students who elect to enter Forestry following First Year University or the equivalent, program sequences exist which would allow the completion of Forestry degree requirements within three additional years. As students enter Second Year Forestry, they must select one of four majors. Students entering the Forest Resources Management major, the Forest Harvesting major, or the Wood Science and Industry major must present at least 12 units (or the equivalent) of university level courses, and must attain an average of at least 60% in their first year of university level study. Applicants must have completed English 100, Mathematics 100 and 101 or 120 and 121, Biology 12 or 101 or 102, Physics 12 or 110 or 115 or 120, and Chemistry 12 or 110 or 120 or their equivalents.

Students who select the Forest Sciences major must have completed English 100, Mathematics 100 and 101, Biology 101 or 102, Chemistry 110 or 120 and Physics 110 or 115, or 120 or their equivalents and have attained an average of at least 60% in these courses.

Applicants who are uncertain about the selection of a major, and those who lack certain of the required courses but may have other advanced credit are urged to consult the Admissions Officer of the Faculty of Forestry.

Application for admission by students or graduates of other universities, colleges, Institutes of Technology or other faculties will be reviewed flexibly. It may be possible to design study programs for such applicants that meet Forestry degree requirements in less than the full four years. Transfer students may be required to validate advance standing in a given subject area by passing an examination set by the instructor.

Undergraduate students with the necessary background and permission of the instructor may be allowed by the Dean to register in a regularly-scheduled graduate lecture course in Forestry.

Graduation Requirements

The undergraduate program in each of the four majors consists of a minimum of four years of university study.

The Forest Resources Management, Forest Harvesting and Wood Science and Industry majors have a common First Year. The decision on which of these majors to pursue can, therefore, be postponed until the end of the Spring Term of the First Year of study. The Forest Science major may require a different First Year, as described below, and students are encouraged to indicate their preference for this program of study upon entering the Faculty.

English Composition Requirement

All students must satisfy the English Composition Requirement of the Faculty of Forestry. To meet this requirement, students must obtain credit for English 100 and must pass the English Composition Test (ECT). Students may write the test in late September, during the December examination period, in late March or April, and in July.

Each student must attach a fee sticker to the ECT booklet. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services.

Students who anticipate difficulty passing the test are advised to enrol in a remedial English course offered by the Centre for Continuing Education. **The last date for passing the English Composition Test is the late March or April sitting in the calendar year in which the student intends to enter Third Year Forestry.**

Part-time Studies

In cooperation with Guided Independent Study, Centre for Continuing Education, credit correspondence courses are available for persons who wish to work towards degree completion, but cannot attend regular full-time on-campus programs. These courses are also accredited by the Association of British Columbia Professional Foresters towards completion of requirements for RPF status. Part-time daytime studies on campus can also be arranged. Non-credit professional continuing education courses, both on and off-campus, are available through Forestry Off-Campus Programs.

Exchange Program with Canadian Faculties of Forestry

Students who maintain a satisfactory academic standing may spend Second or Third Year at another Canadian Faculty of Forestry, provided the Faculty of Forestry at The University of British Columbia gives credit for the course-work chosen. The

visited university collects the normal fees. Though at this time there is no financial assistance for such exchanges, the experience of a different teaching milieu should be of considerable value. At the University of British Columbia, the third year is recommended for these exchanges. Students considering exchange should consult the Associate Dean to arrange their programs before the end of April. Scholarships and bursaries awarded by the University of British Columbia are not available for studies at other universities. Recipients of such awards should normally be able to reserve them for one year until their return to the University of British Columbia.

Field Work

In the four-month period May through August, students are encouraged to obtain practical experience not obtainable in laboratory or field classes. Great importance is placed on this phase of the student's training and the candidate should gain experience relative to the area of interest selected. In addition short field exercises are required from time to time throughout all four years. Such exercises are often scheduled on Saturdays. Attendance is mandatory and students are responsible for expenses incurred.

Program Approval

As part of the registration procedure each student must select a program of courses within the limitations of the requirements for the degree and course schedules. All programs must be approved by a faculty adviser appointed by the Dean. Normally there will be a faculty adviser for each of the four majors and one for first year and for students transferring into Forestry. In case of conflict between a student and his faculty adviser, the student may appeal to the Dean. It is the student's responsibility to select a schedule that allows attendance of all regularly scheduled lectures and laboratories.

Pre-approval of courses

This service is available to all students. It consists of obtaining approval of a program of studies before registration week, such approval does not imply that a place has been reserved for the student in the particular courses and/or lab sections requested. **To secure pre-approval a student must mail the completed "Authorization to Register" form to arrive at the Faculty of Forestry by 15th August.**

All returning 2nd, 3rd and 4th year Forestry students must preregister. The completed "Authorization to Register" form and a **complete** Timetable must be submitted to the Dean's Office by August 15. Students who do not submit the completed Authorization to Register form and the Timetable by August 15, may not be able to secure requested course or lab sections.

All students must still appear in person (except those on field trips) on the date indicated on the "Authorization to Register" form to complete registration.

Examinations and Advancement

The University regulations concerning examination and advancement as listed under General Information in the Calendar, apply. In addition, the Faculty of Forestry sets the following requirements.

(1) Standing and awards will be based on the average mark of all courses attempted in any one year. Only those students who have completed at least 15 units of insession course work during the winter session will be considered for awards.

(2) Students who wish to drop courses may do so after consultation with the instructor and the Associate Dean, provided it is done within two weeks of the start of the course. After two weeks, students normally will not be permitted to drop courses without penalty. Those doing so after two weeks will be assigned a grade reflecting their course record up to that time.

(3) Honours standing on graduation will be granted to those students who have completed at least 15 units of course work during each of their final three years without failures or supplementals, and who have obtained First Class standing during their final year and at least 75 per cent in each of the two preceding years.

(4) The passing mark in Forestry is 50 per cent. In subjects comprising both lecture and laboratory or problem sessions, the candidate must pass both. If a candidate fails to obtain 50 per cent the Faculty may, at its discretion, award a pass in that subject on the basis of a good aggregate standing. Such a pass will be entered on the record of the candidate as an adjudicated pass.

(5) If a student fails a course and is required to take it again, exemption from the laboratory or problem session portion of such a course may be granted.

(6) Only those students with an average grade of 60 per cent or more in 15 units during their first year will be eligible for entry to Second Year Forestry. Students who fail to achieve this standing will be required to withdraw from the Faculty for at least one year. In subsequent years, students who do not pass at least 60 per cent of the course work undertaken or who do not achieve an overall average of 50 per cent, will be required to withdraw from the Faculty for at least one year.

(7) A candidate who does not complete studies for graduation in May following Fourth Year, will be required to register for all incompleted subjects, including graduating thesis or essay, in a subsequent session, summer or winter, and will be assessed the prescribed fees for these subjects. Students who do not complete Forestry 499, B.S.F. Thesis; Forestry 498 B.Sc. Thesis or Forestry 497 Graduating Essay in their Fourth Year must complete these requirements in time for graduation in the fall of the following year. Students who do not complete their thesis or graduating essay within the specified period of time must formally re-register in the B.S.F. or B.Sc. program in a subsequent session and must spend at least one term in residence in order to complete this requirement, and may be required to take additional courses related to the thesis or essay topic.

Supplemental Examinations

In addition to General Academic Regulations under General Information in this Calendar, the Faculty of Forestry will apply the following guidelines for the granting of supplemental examinations:

1. Supplemental examination privileges will be granted in a course provided:
   (a) The normal final exam has been written and a grade submitted.
   (b) The grade attained is at least 40%.
   (c) The overall average for the year including the failed courses is at least 60%.
2. Notwithstanding eligibility under 1, supplemental examination will not be granted if:
   (a) The failure is due to a substandard performance in the laboratory part of a course.
   (b) In Departments outside Forestry, supplementals are not offered.
3. In no case shall supplemental examination privileges be granted in more than 2 courses or more than 4½ units, whichever is the lower.

STUDY PROGRAMS

Forest Resources Management Major (B.S.F.)

The study program in Forest Resources Management is designed to prepare students for admission to the profession of forestry and to serve as a foundation for advanced studies in forest resources management. It is the most general of the four majors and involves all aspects of forest resources biology and management. The resources considered include timber, range, wildlife, recreation, fisheries, and water. The program deals with the unique characteristics of each resource, their interactions, and the manipulation of forests to yield a variety of desirable products in the context of the social and economic environment of Canadian society. Students may emphasize the economic, social, protection, inventory or other quantitative aspects of resources management. Graduates, after appropriate working experience and examination, should be eligible for registration as professional foresters.

The program consists of a minimum of 67½ units of in-session and 7 units of extra-sessional course work. Most of the required course work must be taken in the order indicated. However, 11 units of required work are designated as flexible core and may be taken in any sequence during Second to Fourth Year. Six units to 8 units are designated as approved electives. Before the end of Second Year, students must select one of the areas of interest listed below. They will then be assigned a Faculty Adviser who will supervise their academic program during the final two years. It is expected that the graduating essay or B.S.F. Thesis will be written within the student's chosen interest area. Areas of interest include:

Forest Ecology
Forest Economics and Business Management
Forest Fire Management
Forest Genetics and Artificial Regeneration
Forest Pest Management
Forest Soils
International Forestry
Forest Range Management
Recreation Resources and Landscape Management
Remote Sensing and Land Classification
Silviculture
Timber Management
Watershed Management (including forestry/fisheries interactions)
Wildlife Ecology and Management
Quantitative Methods
Other area of student's choice (with special permission of the Department Head)

First Year		Second Year	
English 100	(3)	Economics 100	(3)
Mathematics 100, 101	(3)	English 301	(1½)
Biology 101 or 102		Soil Science 200	(1½)
or Chemistry 103 or 110	(3)[1]	Geography 214	(1½)
or Physics 110		Forestry 202	(1½)
Forestry 111	(3)	Forestry 203	(1½)
Forestry 130	(3)	Forestry 237	(1½)
		Forestry 238	(1½)
		Forestry flexible core[2]	(4½)
	(15)		(18)
		Harvesting 263[3]	(1½)

Third Year		Fourth Year	
Forestry 305	(1½)	Forestry 415	(1)
Forestry 306	(1½)	Forestry 421	(1½)
Forestry 308	(1)	Forestry 432	(1½)
Forestry 309	(1)	Forestry 445	(½)
Forestry 319	(1½)	Forestry 462	(1)
Forestry 325	(1½)	Wood Science 480	(1½)
Forestry 327	(1)	Forestry 497	(1)
Harvesting 364	(1½)	*or* Forestry 499	(3)
Wood Science 375	(1)	Forestry flexible core and approved electives[6]	(6-8)
Forestry flexible core and approved electives	(6½)		
	(18)		(16)
Forestry 348	(1)	Forestry 451[5]	(3)
Forestry 351[4]	(1½)		

Footnotes:

[1]Select the course not taken at grade 12 level. Note that virtually all courses in Biology, Botany and Zoology require Biology 101 or 102 as a prerequisite.

[2]The flexible core courses, which must all be completed before graduation, are: Soil Science 302 (1½), Plant Science 304 (1½), Forestry 385 (1), Forestry 386 (1), Forestry 290 (1½), Forestry 395 (1½) and 3 units of Arts or Commerce. It is strongly recommended that Forestry 290 and the 3 units of Arts or Commerce be taken in second year.

[3]To be taken during a 10 working-day period immediately preceding second year.

[4]Fourteen days of field study in the Interior of British Columbia immediately prior to the commencement of third year.

[5]Twenty-one working days of field study at the University Research Forest immediately following the spring examination period of third year.

[6]Students who elect Forestry 497 require 8 units; those who take Forestry 499 require 6 units.

Forest Harvesting Major (B.S.F.)

The Forest Harvesting major is designed to prepare the graduate for professional forestry responsibilities, with the emphasis on the planning, design, and administration of: forest road development, including bridges and drainage structures; planning, costing and supervision of logging operations, including site protection and subsequent rehabilitation and preparation; and special projects such as camp construction, log handling and transportation facilities. Graduates should be eligible for registration in the Association of B.C. Professional Foresters.

The program consists of a minimum of 68 units of in-session and 6½ units of extra-sessional course work. There are 7½ units of free electives through which the student can specialize in chosen aspects of forest harvesting. Selection of elective courses will be done in consultation with a faculty advisor. A graduating project must be completed involving a topic within the student's concentration.

First Year		Second Year	
English 100	(3)	Economics 100	(3)
Mathematics 100, 101	(3)	Soil Science 200	(1½)
Biology 101 or 102		Forestry 205	(1½)
or Chemistry 103 or 110	(3)	Forestry 237	(1½)
or Physics 110		Forestry 238	(1½)
Forestry 111	(3)	Wood Science 375	(1)
Forestry 130	(3)	Harvesting 262	(1½)
	(15)	Harvesting 260	(1½)
		Mathematics 200	(1½)
		Physics 170	(1½)
		Physics 236	(1½)
			(17½)
		Harvesting 263[1]	(1½)

Third Year		Fourth Year	
Forestry 303	(1½)	Wood Science 373	(1½)
Forestry 308	(1)	Forestry 325	(1½)
Forestry 309	(1)	Forestry 331	(3)
Forestry 327	(1)	Forestry 442	(1½)
Harvesting 359	(1½)	Forestry 462	(1)
Harvesting 362	(1½)	Harvesting 463	(1½)
Harvesting 363	(1½)	Harvesting 464	(1½)
Forestry 385	(1)	Harvesting 459	(1½)
Civil Engineering 230	(1½)	Forestry 497	(1)
Social Science or		Forestry 445	(½)
Humanities elective	(1½)	Forestry 488	(1½)
Technical electives	(4½)	Technical electives	(1½)
	(17½)		(17½)
Forestry 348	(1)	Forestry 451[3]	(3)
Harvesting 352[2]	(1)		

Footnotes:

[1] Ten working days of instruction in basic surveying immediately preceding second year.

[2] A five day field trip for harvesting students prior to the start of the fall term in Third Year.

[3] Twenty-one working days of field study at the University Research Forest immediately following the spring examination period of Third Year.

Wood Science and Industry Major B.Sc. (Forestry)

The Wood Science and Industry major is designed to give students a strong technical background in wood as a material and a good understanding of wood products manufacture, marketing and utilization. Graduates will be educated for employment in many facets of the wood products industry both technical and managerial.

The program consists of a minimum of 67.5 units of in-session and 4.0 units of extra-sessional course work.

No later than the end of the spring term of the second year, each student will be required to select one of three Areas of Concentration. Each of these sequences of courses is designed to broaden the student's knowledge in one of three specific areas: Forestry, Business Management or Science and Engineering. The Forestry sequence should permit a graduate to qualify for registration in the Association of British Columbia Professional Foresters upon completion of certain other academic and non-academic requirements. The Business Management sequence which has been designed in cooperation with the Faculty of Commerce and Business Administration, is designed for the student interested in the business and financial aspects of the forest products industry. The Science and Engineering sequence allows students interested in mill operation, research and product development to expand their backgrounds appropriately, and it is recommended for those students contemplating a post-graduate degree in Wood Science.

First Year		Second Year	
English 100	(3)	Economics 100	(3)
Mathematics 100, 101	(3)	English 301	(1½)
Biology 101 or 102		Wood Science 335	(1½)
or Chemistry 103 or 110	(3)[1]	Wood Science 372	(1½)
or Physics 110		Wood Science 375	(1)
Forestry 111	(3)	Wood Science 480	(1½)
Forestry 130	(3)	Chemistry 103 or 120[2]	(3)
	(15)	Physics 170	(1½)
		Physics 236	(1½)
		Commerce 457[3] or 120	(1½)
			(17½)

Third Year		Fourth Year	
Chemistry 230	(3)	Forestry 419	(1½)
Forestry 331	(3)	Forestry 445	(½)
Wood Science 371	(1½)	Wood Science 461	(1½)
Wood Science 373	(1½)	Wood Science 473	(1½)
Wood Science 377	(1½)	Wood Science 482	(1)
Area of Concentration	(6½)	Wood Science 487	(1½)
	(17)	Wood Science 488	(1½)
Forestry 348	(1)	Forestry 497	(1)
Wood Science 353[4]	(1½)	*or* Forestry 498	(3)
		Area of Concentration[5]	(6-8)
			(18)
		Forestry 449[6]	(1½)

Footnotes:

[1] Select the one not taken at grade 12 level.

[2] If CHEM 103 has been taken in the first year another course may be substituted.

[3] Recommended for students entering the Business Management Area of Concentration.

[4] Ten working days of on-site study of forest products manufacturing plants during a two week period immediately following the spring examinations of the second year.

[5] Number of units will be determined by whether FRST 497 or 498 is selected.

[6] All students proceeding to fourth year must submit a report based on their summer work experience in the forest industry, no later than the second Monday in October. This report must have a minimum of 5000 words, exclusive of bibliography and appendices.

AREAS OF CONCENTRATION

1. **Forestry**
   Third and Fourth Years
   12½ to 14½ units from: Soil Science 200, Forestry 202, 203, 237, 238, 305, 306, 319, 325, 415, Harvesting 364.

2. **Business Management**
Third Year
Required Courses: Commerce 120, 261, 271, 457, 458.
Fourth Year
Electives: 4½ to 6½ units from Commerce 241, 322, 331, 341, 344*, 466, 469; Forestry 319, Economics 201, 202, 301, 302, 355, 360, 361, 365, 370, 371, Law 356; or other approved courses.
* with permission of instructor.

3. **Science and Engineering**
Third and Fourth Years
Electives: 12½ to 14½ units from Botany 330; Chemistry 205, 311, 330; Civil Engineering 230, Applied Science 278; Chemical Engineering 470, 471; Biology 102, 200, 201; Forestry 430, 431, Wood Science 470; Mathematics 150, 151, 165, 200, 221; Physics 175; or other approved courses.

Forest Science Major B.Sc. (Forestry)

The Forest Science major is for students primarily interested in research and teaching in this field. Emphasis is given to education in basic and interactional phenomena that influence the establishment, growth and development of trees and other forest resources. These include genetics, soils, weather and climate, form (dendrology, anatomy, morphology and cytology), function (physiology and biochemistry), ecology (ecosystem form and function), microbiology and other foundation courses in entomology, pathology, silvics, silviculture and wood science.

The course consists of a minimum 62.5 units of in-session and 7 units of extra-sessional course work. First and second year requirements are combined and include 33 units of course work which must be completed before proceeding to the third year.

No later than the end of the spring term of the second year students must select one of the following areas of concentration: Forest Ecology, Forest Entomology, Forest Pathology, Forest Genetics, Forest Soils, Tree Physiology and Wildlife Ecology. Each area of concentration consists of 9 units of course work plus a thesis (3 units).

Interested students are advised to discuss their program of study with a representative of the Department of Forest Sciences.

First and Second Year		Third Year	
Biology 101 or 102[1]	(3)	Biology 301	(1½)
Biology 200	(1½)	*or* Forestry 430	(1½)
Biology 201	(1½)	*or* Plant Science 322	(1½)
Chemistry 110 or 120[1]	(3)	Biology 334	(1½)
Chemistry 230	(3)	*or* Forestry 302	(1½)
English 100	(3)	*or* Plant Science 413	(1½)
Forestry 111	(3)	Forestry 237	(1½)
Forestry 130	(3)	Forestry 305	(1½)
Forestry 202	(1½)	Forestry 306	(1½)
Forestry 203	(1½)	Forestry 308	(1)
Geography 214	(1½)	Forestry 309	(1)
Mathematics 100[1]	(1½)	Forestry 327	(1)
Mathematics 101[1]	(1½)	Wood Science 375	(1)
Physics 110 or 115 or 120	(3)	Forestry 399	(1)
Soil Science 200	(1½)	Area of Concentration	(3)
	(33)		(15½)
Harvesting 263[2]	(1½)	Forestry 348	(1)
		Forestry 351[3]	(1½)

Fourth Year	
Forestry 445	(½)
Forestry 498	(3)
Area of Concentration	(6)
Arts elective	(3)
Free electives	(4)
	(16½)
Forestry 451[4]	(3)

Footnotes:
[1] These courses must be completed during the First Year in order to satisfy pre- and corequisite requirements for some of the remaining courses.
[2] Ten working days of instruction in basic surveying immediately preceding second year.
[3] Fourteen days of field study in the Interior of British Columbia during a period immediately prior to the commencement of third year.
[4] Twenty-one working days of field study at the University Research Forest during a period immediately following the spring examination period of the Third Year. A special section of this course will be available to students in the Forest Science major.

AREAS OF CONCENTRATION

1. **Forest Ecology**
Third and Fourth Years
Required Courses: Forestry 312, 403, 405; Soil Science 416
Fourth Year
Electives: 3 units from Botany 311*, 312*, 402, 426*, Forestry 386**, 395**, 443, 485**; Plant Science 404**, 431†; Soil Science 321†; Zoology 421**†.

*Recommended for students interested in synecology.
**Recommended for students interested in general forest ecology.
†Recommended for students interested in functional ecology.

2. **Forest Entomology**
Third Year
Required Courses: Plant Science 331 *or* Zoology 311.
Fourth Year
Electives: 6.0 units from Biology 330, Forestry 406, 408, 431, 435, 443; Plant Science 431, 432, 435; Zoology 410*.
*Prerequisite Zoology 311.

3. **Forest Pathology**
Third Year
Electives: Botany 308; Plant Science 336.
Fourth Year
Electives: 6.0 units from Botany 409, 416; Forestry 406; Microbiology 200; Plant Science 437.

4. **Forest Genetics**
Third Year
Electives: 3.0 units from Biology 340; Botany 311; Wood Science 377; Microbiology 324*, 325**.
Fourth Year
Electives: 6.0 units from Animal Science 413†; Biology 436; Botany 414, 437; Zoology 402 or other approved courses.
*Prerequisite Microbiology 200, Biology 201; Corequisite Biochemistry 302.
**Prerequisite Biology 201; Biochemistry 302; Biology 334. (Biology 201 and Biochemistry 302 can be replaced by Biochemistry 300).
†Prerequisite Animal Science 313.

5. **Forest Soils**
Third Year
Required Courses: Forestry 312, 442.
Fourth Year
Required Courses: Soil Science 416, 315 *or* 404*, 413 *or* 414.
*Prerequisite Chemistry 205 or 208.

6. **Tree Physiology**
Third Year
Electives: 3.0 units from Botany 210, 330; Forestry 431, 377; Plant Science 326.
Fourth Year
Electives: 6.0 units from Botany 402, 430, 435; Forestry 411; Soil Science 413, 414.

7. **Wildlife Ecology**
Third Year
Required Courses: Forestry 395; Zoology 203.
Recommended Electives: Plant Science 304; Zoology 323.
Fourth Year
Required Courses: Forestry 495 *or* Zoology 421; Animal Science 424; Plant Science 404; (credit will be awarded for either Zoology 323 *or* Animal Science 424).
Approved Electives: 3 units.

LECTURESHIPS

The H. R. MacMillan Lectureship in Forestry—Through the generosity of H. R. MacMillan, C.B.E., D.Sc., LL.D., and the H. R. MacMillan Family Fund, a fund has been established to provide for the presentation and publication of lectures in forestry by outstanding figures in forestry or the forest industries. In addition, the lecturer is available for several days to speak to forestry students, to consult with members of the Faculty, and to address professional and other groups.

The T. E. Burgess and D. E. Lane Memorial Lectureship in Forestry—In memory of Thomas A. Burgess and David E. Lane, Vice-Presidents of long standing with British Columbia Forest Products Limited, a fund has been established by Mrs. Dorothy Burgess and Mrs. Evelyn Lane and British Columbia Forest Products Limited to provide for the presentation and publication of special lectures in forestry by outstanding authorities in forestry or the forest industry.

The Leslie L. Schaffer Lectureship in Forest Science—In memory of Leslie L. Schaffer, D.Sc., former executive vice-president of Western Plywood Co. Ltd., a fund has been established by Mrs. Leslie L. Schaffer to finance lectures and publications by visiting forest scientists at the Faculty of Forestry, U.B.C.

Thesis Fund

The Tommy Burgess Forestry Student Thesis Assistance Fund—A fund provided by Mrs. T. E. Burgess to assist students with expenses incurred in collecting information required for their B.S.F. or B.Sc. (Forestry) graduating thesis. The fund is administered by the Dean of the Faculty.

Courses of Instruction

Students from other Faculties may take the courses offered in Forestry provided they offer the necessary prerequisites, but in all such cases permission of the instructor must be obtained.

Courses for Graduate Students

Formal lecture courses or seminars are indicated by a single unit value assigned to them. In all problem and research courses, as indicated by a variable number of units, individual laboratory or field investigations or reviews of literature are usually planned to serve the special interests of individual students. When several students have a similar interest in advanced study, formal lectures or seminars may be given. Staff members other than those directing graduate programs may direct studies in specialized topics for interested students, on the recommendation of the students' program supervisors.

Undergraduate students with the necessary background and permission of the instructor may be allowed by the Dean to register in a regularly-scheduled graduate lecture course in Forestry.

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THE FACULTY OF GRADUATE STUDIES

PETER SUEDFELD, M.A., Ph.D. (Princeton), Dean of the Faculty and Professor of Psychology.
SHELDON CHERRY, M.S. (Illinois), Ph.D. (Bristol), P.Eng., F.Am.Soc.C.E., M.C.S.C.E., M.E.I.C., Associate Dean and Professor of Civil Engineering.
STANLEY M. OBERG, M.B.A., Ph.D. (Washington), C.G.A. (Hon.), Associate Dean and Associate Professor of Commerce and Business Administration.

Executive Committee of the Faculty:
It is the responsibility of the Executive Committee, acting on behalf of the Faculty, to ensure adherence to requirements of the Senate of the University regarding graduate programs of study. In all matters concerning admission, programs and examinations, the Dean and Associate Deans act, with the Registrar, as administrative officers for the Executive Committee.

Membership of the Executive Committee:

Ex-officio Members — The Dean (Chairman) and the Associate Deans of the Faculty, the Registrar.

Elected Members—
P. G. HILL, M. GOETZ-STANKIEWICZ, B. C. McBRIDE, B. WIESMAN; Terms expire 1986.
P. R. CULLIS, R. JOHNSON, M. L. T. MacCRIMMON, L. F. MOORE; Terms expire 1987.
R. JORDAN, B. ROUFOGALIS, J. SHERRILL, B. SHIZGAL; Terms expire 1988.

Membership of the Faculty

Ex-officio Members—The President, the Dean and the Associate Deans of the Faculty of Graduate Studies, the Librarian.

All full-time Professors, Associate Professors and Assistant Professors teaching graduate courses or supervising graduate theses, and all Instructors and Lecturers actively engaged in the supervision of graduate students.

Fields of Study

Agricultural Economics
Agricultural Extension
Anatomy
Animal Resource Ecology
Animal Science
Anthropology
Applied Mathematics
Architecture
Arctic and Alpine Research
Asian Research
Asian Studies
Astronomy and Space Science
Audiology and Speech Sciences
Biochemistry
Biology
Biomedical Engineering
Bio-Resource Engineering
Botany
Chemical Engineering
Chemistry
Civil Engineering
Classics
Clinical Engineering
Coal Research
Commerce and Business Administration
Commerce and Business Administration combined with Law
Community and Regional Planning
Comparative Literature
Computer Science
Computer Systems Research
Creative Writing
Dental Science
Economics
Education
Electrical Engineering
Engineering Physics
English
Family Studies
Fine Arts
Fisheries
Food Science
Forestry
French
Genetics
Geography
Geological Engineering
Geological Sciences
Geophysics and Astronomy
Germanic Studies
Gerontology
Greek
Health Care and Epidemiology
Hispanic Studies
History
Human Nutrition
Human Reproductive Biology (see Obstetrics and Gynaecology)
Human Settlements
Hydrology
Industrial Relations
International Relations
Interdisciplinary Studies
Italian
Latin
Law
Linguistics
Mathematics
Mechanical Engineering
Mental Retardation
Metallurgical Engineering
Microbiology
Micro Electronics
Mining and Mineral Process Engineering
Molecular Genetics
Music
Neuroscience
Nursing
Obstetrics and Gynaecology (Human Reproductive Biology)
Ocean Studies Council
Oceanography
Oral Biology
Pathology
Pharmaceutical Sciences
Pharmacology
Philosophy
Physical Education
Physics
Physiology
Plant Science
Political Science
Poultry Science
Psychiatry
Psychology
Pulp and Paper Engineering
Religious Studies
Remote Sensing
Resource Management Science
Science, Technology and Society Studies
Slavonic Studies
Social Work
Sociology
Soil Science
Spanish
Statistics
Surgery
Theatre
Transportation Studies
Urban Studies
Westwater Research
Zoology

The titles of the degrees are given beside the headings in the following pages. Where no degrees are listed in the headings, graduate research leading to a degree may be co-ordinated by the Institutes, Centres, Committees, et al, described.

DEGREES OFFERED

The degrees offered in the Faculty of Graduate Studies are:

Doctor of Philosophy (Ph.D.)
Doctor of Education (Ed.D.)
Doctor of Musical Arts (D.M.A.)
Master of Advanced Studies in Architecture (M.A.S.A.)
Master of Arts (M.A.)
Master of Applied Science (M.A.Sc.)
Master of Business Administration (M.B.A.)
Master of Health Science (M.H.Sc.)
Master of Science in Nursing (M.S.N.)
Master of Science in Business Administration (M.Sc.-Bus. Admin.)
Master of Education (M.Ed.)
Master of Engineering (M.Eng.)
Master of Fine Arts (M.F.A.)
Master of Forestry (M.F.)
Master of Laws (LL.M.)
Master of Music (M.Mus.)
Master of Physical Education (M.P.E.)
Master of Social Work (M.S.W.)
Master of Science (M.Sc.)

THE DEGREES OF Ph.D., D.M.A., AND Ed.D.

A. Admission

1. A student may apply for admission to the degree program by writing directly to the department in which the program is offered or by writing to:

The Dean, Faculty of Graduate Studies,
The University of British Columbia,
235-2075 Wesbrook Mall,
Vancouver, British Columbia, V6T 1Z3.

Students are normally admitted to study only in fields which are formally authorized by Senate to offer Doctoral programs.

2. The number of candidates that can be accommodated is limited, and departments with limited facilities will accept the best qualified students as vacancies occur.

3. Most students begin their program at the start of the Winter Session (the second Monday in September), but the limitation on the number of students that can be accommodated requires that applicants be selected well before this date.

4. Applicants for the Ph.D. and D.M.A. degrees must have completed:
   (a) a Bachelor's degree with First Class Honours (or equivalent), or
   (b) a Bachelor's degree with one year of study in a Master's program with nine units of First-Class average, of which, normally at least five units must be at the 500 level or above and at least five units must be of First Class standing, and clear evidence of research ability (Transfer directly into a Doctoral program is not normally permitted beyond the first year of study and will not be permitted after the completion of the second year in a Master's program); or

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(c) a Master's degree (or equivalent).

5. Applicants for the Ed.D. degree must have completed:
   (a) a Master's degree in Education (or equivalent degree); or
   (b) a Bachelor's degree with First Class standing **and** First Class in Teacher Training, or
   (c) a B.Ed. (Elem.) degree with First Class standing and First Class standing in such prerequiste fifth year work as may have been required.

6. Admission to the Ph.D., D.M.A. or Ed.D. program will be in one of the following categories.
   (a) **Full Standing:** Granted to applicants who have met one of the above requirements.
   (b) **Provisional Standing:** Granted to applicants with minor deficiencies that must be removed, or in cases where doubt exists.

7. There must be clear evidence that the student is competent to pursue studies in the English language. Students may be required to complete a satisfactory TOEFL or Michigan test before any offer of admission can be made.

B. Program of Study

1. (a) Students will normally be required to spend a minimum of three Winter Sessions in full-time status at the University (see "Graduate Student Status" in this section). This period may be reduced for those possessing a Master's degree or equivalent.

   For students with Master's degrees and relevant professional experience, the residence requirement may be reduced to twelve consecutive months on campus. Candidates must meet special requirements, details of which can be obtained from the Dean of Graduate Studies.

   (b) Students must register for each session during their studies. Those who fail to register by the deadlines indicated in the Calendar must pay a late registration fee and may forfeit their candidacy and be required to reapply.

   (c) If the degree is not awarded within a period of six years from initial registration, the student's candidacy will be terminated and the student will be required to withdraw from the program. Extension of candidacy will be granted under exceptional circumstances.

   (d) For provisions regarding on-leave status, see "Graduate Student Status" in this section.

2. A student normally will be Admitted to Candidacy when he or she has completed the residency period, completed all required course work, and passed the comprehensive examination and the research supervisor has certified that the thesis proposal has been approved.

3. The work of each candidate will be supervised by a Candidate's Committee consisting of not fewer than three members; these may include faculty members from a department other than that in which the candidate is writing the thesis. Changes may be made to the membership of the Candidate's Committee subject to the approval of the major department and the Dean of the Faculty of Graduate Studies.

4. Upon registration, the student will consult the Candidate's Committee to develop a program of studies which is then reviewed and approved by the department concerned, and by the Dean of the Faculty of Graduate Studies. The program of studies will consist of seminars, directed readings, consultations, and such formal courses as may be deemed essential for the fulfilment of the requirements for the degree. Some departments require competence in languages other than English. The department in which the student intends to write the thesis shall determine the number of such languages and the level of competence necessary in each. A major part of the candidate's work will consist of a thesis embodying the results of original research.

5. Changes in the program of study may be required during the study period; these must be reviewed and approved by the Candidate's Committee, the major department and the Dean of the Faculty of Graduate Studies.

6. The progress of all students working for the Ph.D., D.M.A., and Ed.D. degrees will be reviewed from time to time and at least once a year in the spring by the department concerned and by the Dean of the Faculty of Graduate Studies. A candidate may be required to withdraw if progress has not been satisfactory as shown by course work, the comprehensive examination, progress on the thesis, or other requirements of the Department or the Faculty of Graduate Studies.

C. Course Work

1. Each Candidate's Committee will recommend the kind and number of courses to be taken by the student in relation to background and to the requirements which are appropriate to the doctoral level in the chosen major field. Students entering directly from the Bachelor's degree under A.4(a), 5(b), or 5(c) must, during the first year of graduate study, complete nine units with a First Class average of which at least five units must be at the 500 level or above and at least five units must be of First Class standing.

2. Courses listed under department programs may not all be offered regularly. Students should apply to the department concerned for detailed information about courses to be offered in any given year.

D. Examinations and Thesis

1. The doctoral student will take the following examinations:
   (a) Course examinations where applicable; a minimum of 65 percent must be obtained.
   (b) A test of the student's ability to read languages other than English where departmental regulations require it.
   (c) A comprehensive Examination normally held after completion of all required course work, and intended to test the student's grasp of the chosen field of study as a whole. The Candidate's Committee will set and judge this examination in a manner compatible with the policy of the department concerned. A department may require a formal examination of the thesis before it is transmitted to the Faculty of Graduate Studies for Final Oral Examination. Students should consult their departmental adviser for information about the departmental requirement.
   (d) The Final Oral Examination or thesis defence:
      (i) All doctoral theses must be assessed externally. The External Examiner is chosen by the Dean, in consultation with the department concerned, from appropriate specialists outside The University of British Columbia. Procedures for choosing a suitable External Examiner must be initiated at least three months before completion of the thesis. The External Examiner's written report should have been received before the Final Oral Examination takes place.
      (ii) At least six weeks' notice is required for scheduling the Final Oral Examination, and all other degree requirements must have been completed. In some departments this means the successful completion of a departmental oral examination of the thesis.
      (iii) The Final Oral Examination is open to all members of the University. Notice of it will be given in the form of a printed program.
      (iv) The Dean will approve the membership of the Examining Committee, and he or his designate will chair the Examination. The Examining Committee will judge the candidate's success and make its recommendation to the Dean of Graduate Studies.

Further details on examination procedures may be found in the "Guide to Procedures on the Completion of Ph.D., Ed.D., and D.M.A. degrees" available from the Faculty of Graduate Studies.

2. Thesis:
   (a) A candidate's thesis must be presented according to procedures and in the form described in the leaflet entitled "Instructions for the Preparation of Graduate Theses"; copies of this leaflet may be obtained from the Special Collections Division in the Library, the Faculty of Graduate Studies, or the candidate's department.

   Students should consult the Calendar regarding deadlines for the submission of doctoral theses.

   (b) The Ph.D. or Master's thesis may be written in either English or French with the approval of the Department concerned.

   With the approval of the Dean's office, and the Department concerned, students in language departments may write their theses in the language of their Department. It is understood, however, that the Abstract will be written in English or French; that the Final Oral Defence will be conducted in English or French; and that a 15 to 20 page precis of the thesis, in English or French, will be filed with the thesis.

MASTER'S DEGREES

A. Admission

1. A student may apply for admission to the degree program by writing directly to the department in which the program is offered or by writing to:

   The Dean, Faculty of Graduate Studies,
   The University of British Columbia,
   #235-2075 Wesbrook Mall,
   Vancouver, British Columbia, V6T 1Z3

Students are normally admitted only into fields which have been given formal permission by Senate to offer a Master's program.

2. The number of candidates that can be accommodated is limited, and departments with limited facilities will accept the best qualified students as vacancies occur.

3. Most students begin their program at the start of the Winter Session (the second Monday in September), but the limitation on the number of students that can be accommodated requires that applicants be selected well before this date.

4. Applicants for a Master's degree must hold a Bachelor's degree or its academic equivalent with
   (a) Honours in the field of the proposed Master's courses with First Class standing in at least six units of Third and Fourth Year course work in that field, or
   (b) First Class standing in at least six units of the course work and at least Second Class standing in the remaining course work at the Third and Fourth Year level prescribed by the department concerned as prerequisite to the Master's program.

5. Applicants who have a Bachelor's degree, or its academic equivalent, which does not meet the requirements of 4(a) or (b) above, but who have had sufficient formal training and relevant professional experience to offset such deficiencies, may be granted admission on the recommendation of the appropriate department or Faculty and approval of the Dean of the Faculty of Graduate Studies.

6. The Master of Arts in Education and the Master of Education Degrees Admission to master's degree programs requires:

(a) an approved Bachelor's degree and one year of teacher education; or
(b) a 5-year Bachelor's degree in Education; or
(c) a 4-year Bachelor's degree in Education and a 15-unit* program of approved senior course work:

with First Class standing in at least 6 units of the senior courses and at least Second Class standing in each of the remaining senior courses prescribed by the Department as a prerequisite to the master's program.

*The 15-unit requirement may be reduced or waived where the Department considers most or all prerequisites already to be met.

In special circumstances, as determined by the Department concerned, completion of a teacher education program may be waived for those applicants who have - (a) a university degree with standing sufficient for admission to a master's program at this University, and (b) adequate experience related to their proposed field of specialization.

7. Admission to the Master's program will be in one of the following two categories:

(a) **Full standing.** Granted to applicants who hold the Bachelor's degree with the required academic standing appropriate to the field of the proposed Master's program.
(b) **Provisional standing.** Granted to students with deficiencies in standing, or who do not have the necessary prerequisites. Prerequisite courses normally are taken in the first year concurrently with courses on the graduate program, but are not counted as credit toward the Master's degree.

8. Students completing courses for a Bachelor's degree at the University of British Columbia, if they lack not more than 75% of a normal final year course load, may be granted permission to register in courses open to graduate students. Upon application they may receive credit for up to six units of such courses toward a higher degree only after registering for such a degree.

9. Students with a Bachelor's degree who lack prerequisites for a chosen field of graduate study may be permitted to register as Qualifying students for no more than one year. Satisfactory completion of a Qualifying year does not guarantee admission to a graduate program. Up to 6 units of eligible courses may be applied to the graduate degree program provided prior permission to register in these courses was obtained from the Department and the Dean of Graduate Studies. Qualifying status is granted only to those students who are recommended by the Departments concerned for such status.

10. There must be clear evidence that the student is competent to pursue studies in the English language. Students may be required to complete a satisfactory TOEFL or Michigan test before any offer of admission can be made.

B. Program of Study

1. The student's program of study must be approved by the department concerned.

2. Some departments require competence in languages other than English. The department in which the student enrols shall determine the number of such languages and the level of competence necessary in each.

3. Students must register for each session during their studies. Those who fail to register by the deadlines indicated in the Calendar must pay a late registration fee and will forfeit their candidacy and will be required to reapply.

4. If the degree is not awarded within a period of five years from initial registration, the student's candidacy will be terminated and the student will be required to withdraw from the program. Extension of candidacy will be granted under exceptional circumstances.

5. For provisions regarding on-leave status, see "Graduate Student Status" in this section.

6. The progress of all students working for a Master's degree will be reviewed from time to time and at least once a year in the spring by the department concerned and the Dean of the Faculty of Graduate Studies. A candidate may be required to withdraw if progress has not been satisfactory as shown by course work that does not meet the requirements of section D.1 below, an excessive number of units below 65% or courses with incomplete standing, unsatisfactory progress on the thesis or graduating essay, or failure to satisfy additional requirements of the Department or the Faculty of Graduate Studies.

C. Program Options

Faculty of Graduate Studies regulations for Master's degrees provide for full-time or part-time studies, as well as for programs with thesis and programs without thesis. The choice of these options lies with the individual departments concerned. Departments are also free to prescribe work beyond the minimum requirements described below. Applicants should contact departments directly to determine what options are available.

1. **Full-time Study**

(a) All programs leading to a Master's degree may be pursued by Full-time study.
(b) A student in a full-time program must spend at least one Winter Session as a full-time student. (See "Graduate Student Status" in this section.)
(c) The following programs may be pursued only through full-time study:

Architecture	Fine Arts (M.F.A.)
Audiology and Speech Sciences	Human Nutrition
Biochemistry	Oceanography
Chemistry	Pharmacology
Community and Regional Planning	Physics
Creative Writing	Physiology
Engineering Physics	Surgery

2. **Part-time Study**

(a) A period in residence is not required. However, courses must normally be taken at the University in order to be credited to a student's program.
(b) Students must obtain departmental approval to register for part-time study.
(c) Part-time studies may be pursued in the following areas:

Agricultural Economics	Germanic Studies
Agricultural Mechanics	Health Services Planning
Anatomy	Hispanic and Italian
Animal Science	History
Anthropology	Law
Architecture	Linguistics
Asian Studies	Mathematics
Astronomy	Mechanical Engineering
Bio-Resource Engineering	Metallurgical Engineering
Botany	Microbiology
Chemical Engineering	Mining and Mineral Process Engineering
Civil Engineering	Music
Classics	Nursing
Commerce and Business Administration	Pathology
Comparative Literature	Pharmaceutical Sciences
Computer Science	Philosophy
Economics	Physical Education
Education	Plant Science
Electrical Engineering	Political Science
English	Poultry Science
Fine Arts (M.A. only)	Psychology
Food Science	Religious Studies
Forestry	Slavonic Studies
French	Social Work
Geography	Sociology
Geological Sciences	Soil Science
Geological Engineering	Statistics
Geophysics	Theatre
Genetics	Zoology

3. **Program with Thesis**

The minimum requirements are:

Thesis	3 - 9 units
Courses numbered 300 or above*	12 - 6 units
Total	15 units

*Six units of courses not including the thesis, must be at the 500 level.
The thesis for the Master of Laws degree is valued at 10 units.

The M.A. in Education requires a minimum of 12 units (including the thesis) in courses numbered 500 or above.

4. **Program without Thesis**

The minimum requirements are:

Courses numbered 300 or above, including at least 12 units of courses numbered 500 or above	15 units

In addition to the 15 units, at least one major essay and a comprehensive examination, in the form of a final written and/or oral examination, are required.

D. Course Work

1. At least 60% must be obtained in any course taken in a Master's program for a student to be granted Pass Standing. However, only three Units of Pass Standing may be credited towards a Master's program; for all other courses credited to the program, at least 65% must be obtained.

2. Courses listed under the departmental programs may not all be offered regularly. Students should apply to the department concerned for detailed information about courses to be offered in any given year.

3. Guided Independent Study courses to a maximum of three units may be used as credit toward a graduate degree program. Courses offered through correspondence may be used for credit if there is prior approval of the Department: Courses offered through the Knowledge Network by satellite, or through the Inter-Institutional Service, may be used for credit if there is prior approval of the Department and the Dean of Graduate Studies.

4. Except as provided in section 8 under Admission, no credit towards the Master's degree will be given for work done prior to registration as a candidate for that degree.

E. Examinations and Thesis

1. A comprehensive examination is required for a Master's program without Thesis.

2. For a Master's degree with Thesis, departments may, at their discretion, prescribe a comprehensive Examination in the field of study and/or a thesis defence.

3. In the creative and performing arts, a thesis may consist of creative work (e.g., paintings, writings, etc.) or of a performance, but departments may, at their discretion, prescribe additional materials.

4. The thesis must be presented according to procedures and in the form described in the leaflet entitled "Instructions for the Preparation of Graduate Theses", copies of which may be obtained from the Special Collections Division of the Library, the Faculty of Graduate Studies, or the department concerned.

Students should consult the Calendar regarding deadlines for the submission of Master's theses.

Supplementals

Supplemental examinations are not granted to students registered in a graduate program.

A course in which a grade of less than 65% was obtained may be repeated for a higher standing if recommended by the department and approved by the Dean of the Faculty of Graduate Studies.

Summer Session

Some graduate courses are available in Summer Session. Students should consult the Summer Session Calendar to learn of the offerings which can be included in their graduate programs.

GRADUATE STUDENT STATUS

1. **Full-Time Graduate Student.**

A full-time graduate student is one in pursuit of a graduate degree devoting full time to his or her academic program. This means that the student may not commit more than 12 hours a week, on the average, of working time, including teaching assistant or research assistant duties, to matters other than the degree program.

The full-time graduate student will be geographically available to the campus, visit it regularly, and make regular use of the University's resources.

Under special circumstances a full-time student may be required to conduct research at some location away from this campus. With the permission of the Dean of Graduate Studies, up to a year of this research time may be counted as residence.

A doctoral student whose residence requirement is twelve consecutive months on campus (see B. Program of Study above) will be considered as being full-time until the special requirements of the program are satisfied.

2. **Part-Time Graduate Student**

A part-time graduate student does not devote full time to his or her academic program. This means that more than 12 hours of working time, are committed to matters other than the degree program. The time that a student is registered as part-time cannot be applied to the residence requirements of a degree program.

3. **On-leave Status**

On-leave status may be granted with permission of the Dean of Graduate Studies to graduate students who find it necessary to interrupt their graduate studies. A student may be on leave for no more than one year in a master's program, and no more than two years in a doctoral program. It is understood that students on leave will not be undertaking any academic or research work or using any of this University's facilities during the period of leave and will renew registration to work on their graduate program immediately following leave. The time so spent will not be counted as part of the limited time period allowed for completion of the degree program. Graduate students on leave will be assessed an additional fee for the leave period.

4. **Faculty as Graduate Students**

The Faculty of Graduate Studies does not accept, as graduate students seeking an advanced degree at this University, members of the full-time teaching staff of the University of British Columbia.

REGISTRATION

1. All students admitted to the Faculty of Graduate Studies normally must register in person on the dates specified for such registration and announced by the Office of the Registrar.

2. Doctoral candidates and Master's degree candidates studying on a full-time basis must thereafter maintain continuous registration during the period of their programs by registering in person or by mail (Off-Campus students only) during the annual registration period.

FINANCIAL ASSISTANCE

The various types of financial assistance available to graduate students at the University of British Columbia are described in the Appendix on "Awards and Financial Aid" at the back of the calendar.

Requests for further information on financial support should be directed to the specific department in which the student intends to study.

RESEARCH SERVICES

All matters concerning the administration of research grants and contracts are handled by the Office of Research Services to which enquiries concerning research policies and procedures should be directed. Students do not normally have occasion to deal with matters of research administration, but they are included in the University Patent and Licensing Plan which provides that, if a student "proposes to patent or license an invention or discovery and University facilities or funds administered by the University were used in making the invention or discovery", then "a disclosure must be made to the University and the rights, assigned to the University in return for a share of any proceeds arising from the invention or discovery". Details of the Plan are available from the Office of Research Services.

Students whose research falls within the UBC definition of Research Involving Human Subjects must receive prior approval from the appropriate Screening Committee for Research Involving Human Subjects. Research Services may be consulted for further details.

GRADUATE STUDENT ASSOCIATION

All students registered in the Faculty of Graduate Studies are members of the GSA. A subsidiary of the Alma Mater Society, the GSA serves to provide liaison between the Graduate Student Society and the AMS.

THEA KOERNER HOUSE GRADUATE STUDENT CENTRE (SOCIETY)

All students registered in the Faculty of Graduate Studies are members of the Thea Koerner House Graduate Student Centre (Society) known as the Graduate Student Society (GSS). The Society operates from the Thea Koerner House Graduate Student Centre donated to the University by Leon Koerner in 1959 in memory of his late wife, and expanded by graduate students in 1969. The society has for its purpose the promotion of the academic, social, intellectual, cultural and recreational interests of its members. The GSS is a registered Society under the Society Act of British Columbia. Its Council is composed of graduate students elected from each department at the University.

COURSES OF INSTRUCTION

For course descriptions see appropriate departmental listing under "Courses of Instruction."

AGRICULTURAL ECONOMICS—M.Sc. degree

Head: J. D. Graham.

Associate Professors: T. Hazledine, R. Barichello, G. Kennedy.

Assistant Professor: C. C. Short.

Prerequisites for M.Sc.: Graduation with a B.Sc. (Agr.), B.A. (Economics), or a degree from another related discipline.

Students interested in the Ph.D. degree may register in the Faculty of Graduate Studies through the Department of Economics where their program of study and thesis will be supervised jointly by members of the Department of Economics and the Department of Agricultural Economics. Applications should be made to the Department of Agricultural Economics.

AGRICULTURAL EXTENSION—M.Sc. degree

Prerequisites: Graduation from the B.Sc. (Agr.) degree program of the University of British Columbia or equivalent, fulfilling the requirements of Admissions Section, together with satisfactory agricultural extension experience.

The program consists of a three-unit thesis plus six units of course work chosen from Agricultural Sciences and six units of course work chosen from Adult Education 412, 514, 515, 518, 583 and Communications Media and Technology 516. Students are normally admitted to the program through one of the departments in the Faculty of Agricultural Sciences. Further information may be obtained from the Office of the Associate Dean, Faculty of Agricultural Sciences or from Department Heads.

ANATOMY—Ph.D. and M.Sc. degrees

Professor and Head: C. E. Slonecker.

Professors: N. Auersperg, P. R. Dow, C. T. Friz, W. K. Ovalle, V. Palaty, W. A. Webber.

Associate Professors: B. H. Bressler, B. J. Crawford, K. R. Donnelly, C. L. Friedman, M. E. Todd.

Assistant Professors: J. Emerman, W. Vogl, J. Weinberg.

The Department offers opportunities and facilities for advanced studies in the classical and modern fields of Anatomy leading toward the M.Sc. and Ph.D. degrees. Members of the Department teach and undertake research programs in a wide range of basic and clinically relevant areas. Special research areas include cell and developmental biology, muscle and membrane biophysics, cellular immunology, carcinogenesis, hypertension, muscular dystrophy, regeneration, and morphological aspects of cell structure and function at the light and electron microscopic levels.

The Department is well equipped and has, for example, the following: scanning and transmission electron microscopes, fluorescence and photo-microscopes, tissue culturing apparatus, ion-specific electrodes, spectro-photometric and radioisotope equipment, electrophysiological instrumentation, laser diffraction, ultracentrifuges, freeze-fracturing equipment, and ultramicrotomes.

Detailed information on M.Sc. and Ph.D. programs and pertinent course offerings are available on request from the Department.

Prerequisite: B.Sc. degree in Life Sciences, Chemistry, Physics, or equivalent, M.D., D.V.M., or D.D.S. degree or equivalent.

INSTITUTE OF ANIMAL RESOURCE ECOLOGY

Professor and Acting Director: J. D. McPhail (Zoology).

Professors: C. S. Holling (Zoology), C. J. Krebs (Zoology), P. A. Larkin (Zoology), C. C. Lindsey (Zoology), D. Ludwig (Mathematics), T. G. Northcote (Forestry and Westwater Research), I. B. Vertinsky (Commerce and Business Administration), C. J. Walters (Zoology), W. G. Wellington (Plant Science), N. J. Wilimovsky (Zoology).

Associate Professors: A. Chambers (Forestry), J. H. Myers (Plant Science), W. E. Neill (Zoology), W. E. Rees (Community and Regional Planning), A. R. E. Sinclair (Zoology), C. F. Wehrhahn (Zoology).

Research Associates: S. Carley, J. Collie, P. Slaney, M. Taitt, A. Tautz.

Honorary Lecturer: L. Dill.

The Institute of Animal Resource Ecology is a part of the Faculty of Graduate Studies concerned with research and teaching in resource ecology. Its aim is to identify principles of theoretical ecology, applied ecology and population genetics and relate them to specific ecological systems, freshwater and marine communities, mammal, bird, fish and insect populations and human systems. The total program emphasizes an interaction among field and laboratory experimentation, mathematical modeling, simulation and analysis. The Institute and the Department of Zoology operate the Biosciences Data Centre, which employs a manager, a systems analyst, and a biological application programmer. Its equipment includes a VAX 11/750 system, a PDP 11/45 system, and numerous peripherals. The purpose of the Data Centre is to make the most effective mathematical, statistical, and computational methods available to biological researchers.

The Institute's activities have been historically closely tied to those of the Department of Zoology. There is also interaction with ecologists in Agricultural Sciences, Forestry, Community and Regional Planning and the Resource Management Sciences Committee. Various other groups share interest in resource science and provide courses that complement the research and teaching program of the Institute. A resource science workshop encourages interdisciplinary studies involving Institute staff and members of the Faculties of Agricultural Sciences, Commerce and Business Administration, and Forestry, the Departments of Economics, Geography and the School of Community and Regional Planning. Graduate research on insect problems can also be arranged to complement the entomological programs offered by Forestry, Plant Science, and Zoology.

A student desiring to undertake graduate work in Animal Resource Ecology should consult the Academic Advisor, J. Myers.

All students are advised to enrol in Zoology 502, a general seminar in advanced ecology which has several informal special interest groups. The following courses are among those available and others may be arranged to meet needs of individual students.

(I) Principles of Resource Ecology.

Zoology 421. Principles of Applied Ecology.
Zoology 500. Special Advanced Courses.
Zoology 502. Advanced Ecology.
Zoology 509. Population Genetics.
Zoology 527. Advanced Population Dynamics.
Resource Ecology 500. Three sections are offered: Directed Studies in Modeling, Resource Science Seminar, and Resource Science Workshop.

(II) Specific Areas of Study.

Zoology 521. Fisheries Biology and Management.
Zoology 522. Limnology Seminar.
Zoology 528. Advanced Ichthyology (A).
Zoology 529. Advanced Ichthyology (B).

(III) Related Disciplines.

Seminar courses are available from time to time in Law, Economics, and other disciplines. Students interested in these offerings should consult their graduate adviser.

ANIMAL SCIENCE—Ph.D. and M.Sc. degrees

Professor and Head: R. Blair.

Professors: D. B. Bragg, C. R. Krishnamurti, B. E. March (Part-time), B. D. Owen.

Associate Professors: R. M. Beames, K. M. Cheng, R. C. Fitzsimmons, R. G. Peterson, D. M. Shackleton, J. A. Shelford, R. M. Tait, R. G. Peterson.

Assistant Professor: J. S. Sim.

Adjunct Professors: W. T. Buckley, D. E. Eastman, L. J. Fisher, D. M. Hamilton, D. A. Higgs, J. H. Robinson.

The Department offers excellent facilities for basic and applied research in nutrition, physiology, embryology, behaviour, genetics, and management of livestock, poultry and wildlife. Teaching and research laboratories provide instrumentation for gas-liquid, thin-layer and paper chromatography, electrophoresis, atomic absorption and colorimetric spectrophotometry, amino acid analysis and radioisotope tracer techniques.

Specialized studies with ruminant species (beef cattle, dairy cattle, sheep and wildlife) and non-ruminant species (swine, rats and wildlife) are offered in a broad range of disciplines. Students may choose studies in nutrition, digestive physiology, biochemistry, fetal metabolism, endocrinology of reproduction, behaviour and genetics. Interested students may choose to work on projects utilizing swine, sheep, beef cattle, captive wild ungulates or two herds of dairy cattle maintained in modern facilities on this campus and at the Oyster River Farm.

Specialized studies in poultry are available in nutrition, embryology, physiology, poultry management, metabolism, behaviour and genetics. Birds are housed in the Poultry Science Teaching and Research Centre located on the campus. Nutrition, management and metabolism studies may utilize birds under laboratory conditions or in production type units. Embryology and physiology studies may be carried out in the hatchery or environmentally controlled physiology facilities. Genetic studies utilize a large population of unique quail stock in a self-contained genetics unit.

Students interested in Aquaculture should consult the Head of the Department to arrange a suitable program leading to the M.Sc. or Ph.D. degree.

Research in collaborating off-campus units is also possible.

Prerequisites for M.Sc.: Bachelor's Degree in Animal Science with First-Class standing in at least six units of Third- and Fourth-Year Animal Science classes, or First-Class standing in at least six units of Third- and Fourth-Year Animal Science classes, and Second-Class standing in the remaining prescribed courses at the Third- and Fourth-Year Level. Applicants holding a Bachelor's degree in Science with acceptable academic standing are also eligible but may have to take six additional units of approved courses in Animal Science. These may be taken concurrently with the Master's program.

Program Information: All students are required to enrol in Animal Science 500 (seminar). In the M.Sc. program, units obtained in this course will not be included when the Faculty requirements for courses numbered 500 or above are calculated. Additional information on requirements is presented in the General Information section under Graduate Studies. See List of Courses under Animal Science for description of courses offered.

M.Sc. and Ph.D. students are strongly encouraged to prepare, in addition to the thesis, a paper(s) based on their thesis work suitable for submission to an appropriate journal.

Library: The MacMillan library, which has a large collection of monographs and periodicals on subjects pertaining to Animal Science and related fields, is located in the main Agricultural Science building. Also, the University Main Library and other branch libraries have large collections in most disciplines.

ANTHROPOLOGY—Ph.D. and M.A. degrees

Professor and Head: (Anthropology and Sociology), Martin G. Silverman.

Professors: Michael M. Ames, Cyril S. Belshaw, Kenelm O. L. Burridge, Richard Pearson (Archaeology).

Associate Professors: Braxton Alfred, Marjorie Halpin, Helga Jacobson, J. E. Michael Kew, R. G. Matson, James V. Powell, Robin Ridington, Elvi Whittaker.

Assistant Professors: Nadia Abu-Zahra, Marie-Francoise Guedon, David L. Pokotylo, Margaret Stott.

Senior Instructor: Madeline Bronsdon Rowan.

(See also Sociology listing)

Advanced study in anthropology is offered in a joint Department of Anthropology and Sociology. Area interests are primarily related to the cultures of North America, South and East Asia, and Oceania, for which there are good supporting library and museum resources. Work in other areas is possible. The main fields of cultural and social anthropology are strongly represented in the department. The department provides focussed training in ethnographic description and analysis, Archaeology and Museum Anthropology. The department includes the Museum of Anthropology, and archaeology, ethnography, social survey, small groups and ethnomethodology laboratories. Work in Canadian Studies is encouraged. The Library has a large collection of microfilm theses, and Human Relations Area micro files. The mathematical, statistical and computer resources available to the department are highly developed. Inter-disciplinary contacts are encouraged, and links are maintained with such departments as Asian Studies (which has major library collections), Religious Studies and Linguistics.

Information is available from the Department's Admissions Officer in Anthropology about qualifications for admissions to the M.A. and Ph.D. programs and about course requirements, examinations, and other details of the programs.

Theses may be written in French when a suitable committee can be arranged.

INSTITUTE OF APPLIED MATHEMATICS

Professor and Acting Director: Colin W. Clark (Applied Mathematics).

Professors: Frank H. Clarke (Applied Mathematics), Ulrich G. Haussmann (Applied Mathematics), Donald Ludwig (Applied Mathematics; Animal Resource Ecology), Albert W. Marshall (Statistics), Robert M. Miura (Applied Mathematics; Pharmacology and Therapeutics); Lawrence A. Mysak (Applied Mathematics; Oceanography), Rodrigo A. Restrepo (Applied Mathematics), Brian R. Seymour (Applied Mathematics), James M. Varah (Computer Science), James V. Zidek (Statistics).

Associate Professors: Uri Ascher (Computer Science), George W. Bluman (Applied Mathematics), Neil H. Fenichel (Applied Mathematics), Frederick P. Glick (Statistics), A. John Petkau (Statistics), Martin L. Puterman (Commerce).

Assistant Professors: Harry Joe (Statistics), Piet de Jong (Commerce).

A primary function of the Institute of Applied Mathematics (IAM) is to coordinate the teaching of advanced courses in applied mathematics and to provide degree programs which may be interdisciplinary in nature. These programs utilize courses offered by various departments on campus. Graduate students in the IAM are supervised by faculty members each of whom holds an appointment in some department of the University. The administrative structure of the IAM provides maximum flexibility in arranging programs according to the needs and interests of individual students.

The Institute also promotes interdisciplinary research activities involving applied mathematics. To this end, the Institute organizes colloquia and special seminars and provides consultative assistance to those who use applied mathematics in their research.

Graduate Programs

The Institute designs and oversees interdisciplinary M.Sc. and Ph.D. degree programs for graduate students from different departments on campus interested in graduate work involving applied mathematics. The basic requirements for these programs are sufficiently flexible to accommodate the particular academic background and career objectives of an individual student. Fields of mathematics involved in interdisciplinary programs of graduate studies may be grouped into two areas:

Applied Analysis: Differential and integral equations, asymptotic and perturbation techniques, similarity methods, numerical analysis, linear and nonlinear wave propagation, methods of mathematical physics, applied probability theory.

Optimization: Mathematical programming, combinatorics, graphs, trees, network flows, game theory, decision theory, search techniques, stochastic processes, queuing, dynamic programming, optimal and stochastic control.

Areas of mathematical modelling range from fluid and solid mechanics (including their modern components of meteorology, oceanography, seismology, geology, etc.), to biology, ecology, economics, neurophysiology, resource management, transportation, and other social and behavioural sciences.

Basic requirements in M.Sc. and Ph.D. programs are outlined below. There may be other requirements depending on the student's academic background and intended area of study.

M.Sc. Programs: Minimum course requirements are:

Courses (numbered 400 or greater)*	12 units
Thesis	3 units
Total	15 units

* Of the course units, at least 6, not including the thesis, must be at the 500 level, and 3 of these must be from the Department of Mathematics. At most, 9 of the 12 course units may be taken in any one department.

Ph.D. Programs: Normally, only a student with an M.A. or M.Sc. degree is considered for admission to a Ph.D. program. Within 2 years of entering the program, a student must pass a comprehensive examination. The student is required to take a comprehensive oral exam covering one major and two minor areas. The exam may be attempted at most twice and must be passed within the first two years in the program. The areas for examination must be selected from (1) applied analysis, (2) numerical analysis, (3) optimization, or (4) an area of application. The major requirement for the degree is a thesis based on original research, and students are encouraged to begin it as early as possible. Upon completion, the thesis must be defended at an oral examination administered by the Faculty of Graduate Studies. The student must also demonstrate reading knowledge of at least one foreign language appropriate to the student's intended research area.

Courses which are expected to form a part of a graduate student's program in applied mathematics are divided into three groups as follows:

Group I. Courses in mathematics and mathematical methods. Examples of these are:
Mathematics 400 (Applied Analysis II), 407 (Applied Matrix Analysis), 418 (Introduction to Probability), 426 (Calculus of Variations and Optimal Control), 500 (Methods of Applied Mathematics)
Mathematics 506/423 (Partial Differential Equations)
Mathematics 518 (Probability)
Mathematics 520 (Numerical Analysis)
Mathematics 534 (Topics in Applied Mathematics)
Computer Science 402 (Numerical Computation II), 510, 520 (Numerical Methods in Partial Differential Equations I, II)
Commerce 514 (Mathematical Programming)

Group II. Courses of a general nature in which mathematical concepts and techniques common to various disciplines are discussed and applied to specific problems. Examples of these are:
Mechanical Engineering 569 (Nonlinear Vibrations)
Philosophy 402 (Symbolic Logic)
Physics 510 (Stochastic Processes in Physics)
Zoology 527 (Theoretical Population Dynamics)

Group III. Courses dealing with areas of applications in biology, communication theory, control theory, economics, ecology, fluid mechanics, neurophysiology, oceanography, statistics, and psychology. Many of these courses may not be of a mathematical nature. In particular for a student with a purely mathematical background some of these courses can serve as an introduction to an area of application.

It is expected that a student associated with the Institute will take a significant number of courses both in Group I and in Groups II and III.

Admission to IAM

To enter a degree program supervised by the Institute, a student must first be admitted to an academic department which is closely related to the applicant's interests, e.g., Mathematics, Economics, Mechanical Engineering, etc. The student's first year program is planned with an IAM adviser (appointed by the Director). After successful completion of this first-year program, an interdisciplinary committee is appointed to supervise the student's progress towards meeting the degree requirements.

To obtain the necessary application forms and detailed information on the activities of the Institute and on financial aid, students should write to the Director of the Institute of Applied Mathematics. The department to which the student wishes to be admitted should be clearly indicated.

ARCHITECTURE—M.A.S.A. degree

Director: Douglas Shadbolt.

Professor: Charles A. Tiers.

Associate Professors: Raymond J. Cole, (Chairman, Graduate Program Committee), Robin P. A. Clarke, Richard W. Seaton, Ronald B. Walkey, Woodruff W. Wood.

Assistant Professors: John A. Gaitanakis, Andrew Gruft, Dino Rapanos, Joel Shack.

Adjunct Professor: Shelagh Lindsey.

Senior Instructor: Stephen I. Taylor..

The Program

The School of Architecture offers a post-professional graduate program leading to the degree, *Master of Advanced Studies in Architecture*.

This degree is designed for those who have a professional degree in architecture and have some experience in architectural practice. All candidates are advised that particular aptitudes and experience will be required for this program, and admission will be based on faculty judgement over and above the general admission requirement of the Faculty of Graduate Studies. The program is post-professional and therefore is not intended to fulfil the requirements for certification by the RAIC Certification Board as a step toward licensing as an architect in British Columbia or the other provinces in Canada.

Course of Study

This program will allow the student to investigate an area of knowledge within the broad field of architecture in collaboration with one or more members of the faculty interested in that area and engaged in on-going developmental research, or consulting activity in that area. The Research Project is expected to draw together and synthesize existing knowledge in architecture and related fields to produce a clarification or new understanding in the field. The synthesis may result in a design development and report or a written thesis.

Entering students will be required to work out a course of study with an adviser for approval by the Graduate Program Committee. The program must prepare them for work in the chosen thesis area and fill in gaps in knowledge areas relevant to the thesis topic. In some cases makeup courses will be required beyond the total number of units of coursework prescribed for the degree.

In order to fulfil the requirements for the degree of Master of Advanced Studies in Architecture the student must complete the course of study for a total of 24 units. All students are required to put in no less than 3 terms of full-time attendance in the program. Part-time study will be allowed only under rare circumstances, and then only with the approval of the Graduate Program Committee.

Students normally complete this program within two academic years. No longer than five years may elapse between first registration and satisfactory completion of the thesis.

Course of Study: First Year

Architecture 407 (1½) Research Methods in Architectural Evaluation
Architecture 500 (1½-3)
Architectural Seminar
and 7½ units of coursework selected in consultation with the student's adviser from courses offered by the School of Architecture or other Departments in disciplines related to the student's research interests.

On completion of the course requirements the student will undertake a Directed Study of 3 units (Architecture 547), under the guidance of a thesis supervisor which will focus the research activity and define the thesis. The student will then enrol in the Architecture 549 Research Project and Thesis for the M.A.S.A. degree to complete the program.

Areas of Study

Current areas of advanced study in the School of Architecture include:
- Urban Design
- Urban Conservation and Re-use of Existing Structures
- History and Theory of Architecture and Urban Form
- Housing
- Energy Conscious Design
- Regional Problems in Architecture
- Pre-design and User Oriented Implementation Processes

ARCTIC AND ALPINE RESEARCH

There are a number of individuals at The University of British Columbia involved in research in arctic and alpine areas. A Committee on Arctic and Alpine Research coordinates the activity, funding and mutual interests of this group. At present the university's efforts involve anthropology, biology, geography, geology, glaciology and planning in both Alpine and Arctic environments. Current areas of special interest to the Committee are the Western Arctic, including the Yukon Territory and parts of the Northwest Territories and high altitude work in British Columbia. The Committee sponsors lectures, provides a unified group to approach granting bodies, and a means whereby interested faculty and graduate students may exchange arctic and alpine information.

Interested individuals wishing to contact this Committee should forward their request to the Dean of the Faculty of Graduate Studies for transmittal to the Committee.

INSTITUTE OF ASIAN RESEARCH, ASIAN CENTRE

Professor and Director: T. G. McGee (Geography).

The Institute of Asian Research, located in the Asian Centre at UBC, sponsors and coordinates research activities concerning Asia and the Pacific. While not directly involved in classroom teaching, the Institute does provide liaison for seminar presentations and special lectures by Asian area specialists working at or visiting UBC. The aim of the Institute is to facilitate interaction among people from different disciplines and backgrounds, from both campus and community, who share a common interest in Asia and the Pacific. In this way it is hoped that a stimulating environment for the development of Asian studies in Canada may be created.

The Institute also organizes workshops and conferences, co-sponsors art exhibitions and cultural events, runs a film program, and administers the multi-functional areas of the Asian Centre. The *Asia Pacific Report*, a newsletter focusing on current activities relating to Asia on campus and in the community, is published by the Institute. To receive regular notifications of events, individuals are encouraged to join *Friends of the Asian Centre*. Address: Institute of Asian Research, Asian Centre, 1871 West Mall, The University of British Columbia, Vancouver, B.C., V6T 1W5, Canada. Telephone: (604) 228-4688.

ASIAN STUDIES—Ph.D. and M.A. degrees

Professor and Head: D. L. Overmyer.

Professors: A. N. Aklujkar, C.-Y. Chao, P. Harnetty, L. N. Hurvitz, B. M. Morrison, E. G. Pulleyblank, M. Soga, K. Tsuruta, L. M. Zolbrod.

Associate Professors: K. E. Bryant, Michael S. Duke, K. G. Hansen, J. F. Howes, J. D. Schmidt, K. Takashima.

Assistant Professor: R. Goldman.

Senior Instructor: H. T. Chen.

There are good facilities for advanced work in various fields of Asian Studies. The purchase in 1958 of the P'u-pan collection gave the University of British Columbia one of the major Chinese libraries in North America. Subsequent purchases have served to consolidate this position. A good foundation for the Japanese collection was laid by the acquisition of books from the libraries of the late E. H. Norman and G. B. Sansom and by the purchase of a Tokugawa map collection. The university library is also a depository for Japanese Government Publications. The library's holdings now exceed 265,000 volumes in East Asian Languages in addition to substantial holdings in western languages and micro-form. The library also has a growing collection related to South Asia and the founding in 1968 of the Shastri Indo-Canadian Institute, in which the university is a founder-member and major participant, is greatly assisting this development. It is estimated that the present extent of the collection in Indic languages such as Hindi, Urdu, Punjabi, Sanskrit, Prakrit, Bengali, Marathi and Tamil is 30,000 volumes. In addition, there are publications bearing on South Asian studies in micro-form and in Western languages.

The Department offers the degrees of Ph.D. and M.A. in Chinese, Japanese and South Asian Studies, in the fields of language, literature, and pre-modern history. It also provides language training for those doing graduate work relating to China, Japan, and South Asia in other departments. Those interested in graduate studies relating to Asia in fields such as modern history, political science, economics, geography, anthropology, fine arts, should apply to the departments concerned.

Admission to the M.A. program in Asian Studies normally requires graduation in the Honours program in Chinese, Japanese, or South Asian Studies, or a major in Chinese, Japanese, or South Asian Studies with additional units. This implies four years of language study. The Department is prepared to accept a limited number of students who are otherwise well-qualified and show linguistic aptitude but have less than this amount of preparation in language. Such students will be required to spend one or two extra years in their M.A. program making up this deficiency.

Admission to the Ph.D. program in Asian Studies normally requires an M.A. in Asian Studies or its equivalent. Candidates for the Ph.D. must have *before admittance* an adequate command of Chinese, Japanese, Hindi/Urdu, or Sanskrit. In the case of Chinese this will normally mean a competent reading knowledge of both modern and classical forms of the language.

ASTRONOMY—(see Geophysics and Astronomy)

AUDIOLOGY AND SPEECH SCIENCES—Ph.D. and M.Sc. degrees

Professor and Director: J. H. V. Gilbert.

Professor: A.-P. Benguerel.

Assistant Professor: C. E. Johnson.

Research Associate: D. D. Greenwood.

Senior Instructor: E. D. Duncan, N. Lamb.

Clinical Assistant Professor: D.-Y. Chung.

The School of Audiology and Speech Sciences offers a two-year post-graduate program leading to a Master of Science degree. The program is designed for full-time students only. During the first year, all students follow the core curriculum of the School. To provide the graduate with a background in all aspects of vocal communication, emphasis is placed upon understanding the normal functioning of speech, hearing and language as these relate to clinical training; this constitutes at least 50% of the program. During the summer between the first and second years, students complete four months of continuous supervised internship at appropriate institutions, in and around the Greater Vancouver area. Supervised clinical training is given throughout the year.

The School also offers a program leading to the Ph.D. degree, with specialization in one of the following areas: experimental phonetics, speech production, speech perception, neurolinguistics, language acquisition, psychoacoustics and physiological acoustics.

A brochure giving details is available from the School's office.

A number of courses are considered appropriate preparation for graduate work in Audiology and Speech Sciences. A degree in linguistics is required at U.B.C.

In the selection of students for training, emphasis is placed not only on academic record and references, but also upon a student's professed motivation for entering this field of study. In order to ascertain such motivation, a letter stating interests in speech, hearing and language must be submitted at the time of application. Among other things, such a letter should contain information concerning experience and academic preparation relevant to the program, reasons for interest in the field, whether the applicant is particularly interested in any given aspect(s) of the field, as well as any other information the applicant feels appropriate to the assessment of the application.

All documents must be received by March 31.

Students accepting an offer of admission to the M.Sc. program in the School of Audiology and Speech Sciences, at the time of acceptance of admission are required to pay a non-refundable deposit of $100.00 to be applied towards the student's first-term tuition.

Inasmuch as the Master of Science program runs for 20 consecutive months, (i.e. two academic years, from September through April plus the intervening summer), it is advisable that the student have made appropriate financial arrangements prior to the beginning of the first year, since this School can provide only limited financial support for students. Given the intense nature of the program, no part-time work should be taken over the two year period. Students may qualify for a Canada Student Loan through their Province of residence. Those students applying for financial assistance (e.g. Canada Student Loans, Provincial Loans) should indicate on their applications that the M.Sc. program covers a period of 20 consecutive months.

BIOCHEMISTRY—Ph.D. and M.Sc. degrees

Professor and Head: Dennis E. Vance.

Professors: Philip D. Bragg, E. Peter M. Candido, Pieter Cullis, Patrick P. Dennis, R. S. Molday, James F. Richards, Michael Smith, Gordon M. Tener.

Professor Emeritus: Charles T. Beer.

Associate Professors: C. Astell, Albert F. Burton, Grant Mauk.

Assistant Professors: Gary D. Brayer, Roger W. Brownsey, R. T. A. MacGillivray.

Senior Instructors: Richard Barton, Everard Trip.

Instructor: Jean Vance.

Ph.D. degree

Facilities are available for original investigations in many fields of biochemistry. Candidates must hold an Honours degree in Biochemistry with high standing or a Master's degree in Biochemistry or the equivalent and are required to complete courses in Biochemistry and related fields in accordance with the recommendations of the Department and the Candidate's Committee.

M.Sc. degree

Prerequisite: Candidates with diverse backgrounds can be accepted providing they have graduated with high standing from university programs giving a strong background in science.

M.Sc. course includes Biochemistry 303 and 301 if not already taken; thesis, counting 6 units, and courses approved by the department in Biochemistry and related fields.

Biochemistry 303 and 301 or the equivalent, are prerequisite to all graduate courses in Biochemistry.

BIOLOGY—Ph.D. and M.Sc. degrees

The field of Biology is not treated by a single department. Students wishing to pursue a graduate program in Biology should consult the department or departments most appropriate to the field of specialization. Graduate study in Biology is designed to accommodate those students with a diverse biological background. The Life Science departments able to accommodate graduate students for an M.Sc. or Ph.D. in Biology are: Biochemistry, Botany, Microbiology, Oceanography, Pharmacology and Therapeutics, Physiology and Zoology.

For the M.Sc. degree, at least one member of the Candidate's Committee must be from a Life Science department different from that in which the Candidate is enrolled. For the Ph.D. degree, at least two members of the Candidate's Committee must be from Life Science department(s) other than that in which the student is enrolled.

BIOMEDICAL ENGINEERING

Research in Biomedical Engineering is carried out in the Departments of Chemical, Electrical and Mechanical Engineering, in association with the Faculty of Medicine and the affiliated teaching hospitals.

BIO-MEDICAL SCIENCES

Combined M.D. and Ph.D. Degree Program

This program is intended for the exceptional student contemplating an academic career in the Biomedical Sciences who is prepared to accept a program which will require a minimum period of 6 years. To be eligible, the student must have completed a B.Sc. degree with FIRST CLASS HONOURS (or equivalent), must be selected as a First Year medical student by the Faculty of Medicine, and must be accepted into a Ph.D. program approved by the Faculty of Graduate Studies.

The M.D.-Ph.D. student will be required to be registered as a graduate student for a minimum of 3 (12-month) years. During this period, the student will be permitted to take all the courses required for the completion of First Year Medicine. In addition, the candidate is expected to undertake all the course work and research prescribed by the candidate's Ph.D. committee. Only when this program is substantially complete to the satisfaction of the committee will the candidate be permitted to register in Second Year Medicine. If necessary, the summer period between Second and Third Year Medicine may be used to defend the Ph.D. thesis.

Since the course work and the combined program can be expected to be heavy, the student is advised to arrange to begin the program in June rather than in September of the first graduate student year.

A medical student who has a B.Sc. degree with first class honours and who has completed First Year Medicine with high standing is eligible for the M.D.-Ph.D. program. However, a graduate student is not eligible for the combined program until he or she has been selected as a medical student by the Admissions Selection Committee of the Faculty of Medicine in the normal way.

Students contemplating application for admission to the Combined M.D.-Ph.D. program should consult the Office of the Dean of Medicine (Admissions) by the Fall preceding the year of desired entry to this program.

BIO-RESOURCE ENGINEERING—M.A.Sc., M.Sc. degree.

Professor and Head: Leonard M. Staley.

Professors: N. Ross Bulley, K. Victor Lo, John W. Zahradnik.

Assistant Professor: Sie-Tan Chieng.

The Master of Applied Science is offered for qualified engineering graduates. Prerequisite — Graduation in Bio-Resource Engineering or other branches of engineering. The M.Sc. is offered for qualified graduates from Agricultural Sciences, Forestry and Science. Prerequisite — Graduation from one of these faculties and approval of their course by the head of the department. Ph.D. programs can be arranged for suitable candidates in conjunction with other engineering departments and interdisciplinary committees.

The Department carries out studies in Water Quality and Hydrology; Irrigation and Drainage Engineering; Environmental Control; Aquacultural Engineering, Physical, Rheological and Thermal Properties of Biological Materials; Food Process Engineering; Biotechnology and Biomass Conversions for Waste Treatment and Utilization; and design of Horticultural and Reforestation operations.

Course—Includes 6 units in the Department of Bio-Resource Engineering of which at least 3 units must be courses numbered 500 or above.

Part-time students may enrol in the M.A.Sc. and M.Sc. degree programs.

BOTANY—Ph.D. and M.Sc. degrees

Professor and Head: Anthony D. M. Glass.

Professors: R. J. Bandoni, T. Bisalputra, B. A. Bohm, Kathleen M. Cole, Beverley R. Green, A. J. F. Griffiths, G. C. Hughes, J. R. Maze, C. O. Person, G. E. Rouse, R. F. Scagel, W. B. Schofield, F. J. R. Taylor, G. H. N. Towers.

Associate Professors: R. E. Foreman, F. R. Ganders, P. G. Harrison, P. J. Harrison, I. E. P. Taylor, R. A. Turkington.

Assistant Professors: R. E. De Wreede, J. McPherson, L. Oliveira.

Associate Member: K. Klinka.

Senior Instructor: G. E. Bradfield.

Students wishing to enrol in graduate courses should consult the instructor in charge for permission prior to registration.

CHEMICAL ENGINEERING—Ph.D., M.A.Sc. and M.Eng. degrees.

Professor and Head: J. R. Grace.

Professors: R. M. R. Branion, N. Epstein, J. Lielmezs, A. Meisen, K. L. Pinder, D. W. Thompson, A. P. Watkinson.

Associate Professors: L. R. Galloway, C. W. Oloman.

Assistant Professors: J. L. Bert, B. D. Bowen, C. J. Lim.

Honorary Professor: R. J. Kerekes.

Adjunct Professor: L. S. Gormely.

The Department offers facilities for research studies in the following fields:
(a) Mass, momentum and heat transfer;
(b) Chemical engineering unit operations;
(c) Applied thermodynamics and kinetics;
(d) Biochemical and biomedical engineering;
(e) Pollution control studies;
(f) Electrochemical engineering;
(g) Modelling and optimization;
(h) Pulp and paper technology;
(i) Energy.

The Department also operates a joint research program at M.A.Sc. and Ph.D. level with British Columbia Research and with the Pulp and Paper Research Institute of Canada in areas of common interest.

Part-time students may enrol in the M.A.Sc. and M.Eng. degree programs.

Ph.D. degree

Prerequisite: Graduation or equivalent in Chemical Engineering, or graduation in Bio-Resource Engineering, Mechanical Engineering, Metallurgical Engineering or Mining and Mineral Process Engineering. Graduates from other branches of engineering may be accepted on approval of their course by the Head of the Department. Graduates from other fields such as Chemistry, Physics or Biology can be accepted, on a provisional basis and at the discretion of the Department Head and the applicant's proposed supervisor. These students should have substantial credits in subjects pertinent to Chemical Engineering, and will be required to complete selected undergraduate courses in Chemical Engineering before receiving a degree.

M.A.Sc. degree

Prerequisite: As for the Ph.D. degree.

Program: Must include Chemical Engineering 598, and at least 9 units of courses approved by the student's supervisor and the Department Head. Normally, the required 9 units will be made up of 6 units chosen from graduate courses within the Department, and 3 units of courses outside the Department. Thesis 6 units.

M.Eng. degree

Offered primarily for candidates who have a minimum of two years work experience after obtaining their B.A.Sc. degree. Under special circumstances students with less than two years work experience may be accepted.

Prerequisites: Graduation or equivalent in Chemical Engineering, or graduation in Bio-Resource Engineering, Mechanical Engineering, Metallurgical Engineering or Mining and Mineral Process Engineering. Graduates from other branches of engineering may be accepted on approval of their course by the Head of the Department.

Program: Must include Chemical Engineering 596 and 598 and 15 additional units of courses approved by the student's adviser and the Department Head. Normally, these 15 units will be made up of 6 units chosen from graduate courses within the Department, 3 units of courses outside the Department and an additional 6 units chosen from within or outside the Department.

CHEMISTRY — Ph.D. and M.Sc. degrees

Professor and Head: L. S. Weiler.

Professors: F. Aubke, N. Basco, A. Bree, C. E. Brion, D. E. Brooks, E. E. Burnell, D. P. Chong, M. B. Comisarow, J. A. R. Coope, W. R. Cullen, D. H. Dolphin, G. G. S. Dutton, J. B. Farmer, D. G. Fleming, D. C. Frost, M. C. L. Gerry, L. D. Hall, L. G. Harrison, F. G. Herring, B. R. James, D. G. L. James, J. P. Kutney, P. Legzdins, D. E. McGreer, A. J. Merer, K. A. R. Mitchell, T. Money, E. A. Ogryzlo, E. Piers, R. E. Pincock, J. R. Sams, J. R. Scheffer, B. Shizgal, R. F. Snider, R. Stewart, R. C. Thompson, J. Trotter, D. C. Walker.

Associate Professors: R. J. Anderson, M. D. Fryzuk, G. N. Patey, A. Storr.

Assistant Professors: G. S. Bates, M. Blades, L. D. Burtnick, S. G. Withers.

The Department has many modern research instruments available, among which are: analytical and fully-computerized high resolution mass spectrometers, vacuum ultraviolet, far infrared and Raman spectrographs and spectrometers, stopped-flow spectrophotometer; microwave spectrometers; ORD and circular dichroism apparatus; electron spin and electron double resonance spectrometers; wide-line, spin echo, and high-resolution Fourier transform nuclear magnetic resonance spectrometers; Mossbauer spectrometers; automatic radioactive counters; automatic X-ray diffraction equipment; analytical and preparative gas chromatographs; autoclaves; magnetic balances; high-energy electron accelerator; a Gammacell 220; Q-switched ruby lasers; a helium liquifier; u.v. photoelectron, electron impact and ESCA spectrometers; ion cyclotron resonance spectrometers; preparative ultracentrifuges and cold room facilities; amino acid analysers. The TRIUMF cyclotron is available. Facilities exist for mycochemistry, phytochemistry, and biogenetic studies. There are excellent computer facilities and mechanical, electronics and glassblowing workshops. A microanalytical service is also provided. Research facilities are available for accommodation of over 300 graduate students, postdoctoral fellows and academic staff.

The Department of Chemistry offers a wide variety of research programs leading to the degrees of Master of Science and Doctor of Philosophy in the following fields: Analytical Chemistry, Bio-Inorganic Chemistry, Bio-Organic Chemistry, Bio-Physical Chemistry, Carbohydrate Chemistry, Chemical Applications of the Mossbauer Effect, Chemical Biology, Chemical Cryogenics, Chemical Kinetics and Reaction Mechanisms, Chemical Physics, Chemistry of Biologically Important Substances, Chemistry of the Solid State, Chemistry of Steroids, Alkaloids and Terpenes, Combustion and Oxidation Processes, Electron Spin Resonance Spectroscopy, Electronic Spectroscopy, Electron Nuclear Double Resonance Spectroscopy, Heterocyclic Chemistry, Homogeneous Catalysis, Infrared and Raman Spectroscopy, Inorganic Fluorine Chemistry, Inorganic Ring Systems, Ion Cyclotron Resonance Spectroscopy, Isotope Exchange Reactions, Kinetic Spectroscopy, Macromolecular Chemistry, Magnetochemistry, Mass Spectrometry, Microwave Spectroscopy, Molecular Beams, Molecular Spectroscopy and Molecular Structure, Non-Aqueous Solution Chemistry, Nuclear Chemistry, Nuclear Magnetic Resonance Spectroscopy, Nuclear Quadrupole Resonance Spectroscopy, Organic Photochemistry, Organometallic Chemistry, Photochemistry, Photoelectron Spectroscopy, Physical Organic Chemistry, Phytochemistry, Radiation Chemistry, Structural Inorganic Chemistry, Structure, Synthesis and Biogenesis of Fungal Metabolites, Surface Chemistry and Surface Science including Auger and LEED Spectroscopy, Synthetic Inorganic Chemistry, Synthetic Organic Chemistry, Theoretical Chemistry, X-Ray Diffraction Crystallography.

M.Sc. degree

Prerequisite: Honours in Chemistry or Biochemistry or Physics, or combined Honours in Chemistry and Physics, Chemistry and Mathematics, Chemistry and Biochemistry, Chemistry and Oceanography, or Chemistry and Biology; or a Bachelor's degree in Chemical Engineering with at least Second Class standing; or a single Major in Chemistry with at least Second Class standing; or the equivalent to any of the above.

Course includes thesis, Chemistry 548 and nine units of graduate or advanced courses in Chemistry and related subjects.

Ph.D. Degree

Candidates are required to hold an M.Sc. degree in Chemistry or a B.Sc. degree with high standing in an Honours or combined Honours Chemistry program or equivalent. Students in the M.Sc. program may transfer into the Ph.D. program at the end of their first year provided they meet the transfer requirements of the Faculty of Graduate Studies.

Course work in the Ph.D. program is assigned in accordance with the recommendation of the Department and the candidate's Ph.D. committee.

CIVIL ENGINEERING — Ph.D., M.A.Sc., and M.Eng. degrees.

Professor and Head: W. K. Oldham.

Professors: P. M. Byrne, R. G. Campanella, S. Cherry, W. D. Finn, R. O. Foschi, R. F. Hooley, M. de St. Q. Isaacson, B. Madsen, D. S. Mavinic, S. Mindess, N. D. Nathan, M. D. Olson, M. C. Quick, S. O. Russell, Y. P. Vaid.

Associate Professors: D. L. Anderson, J. D. Anderson, G. R. Brown, W. F. Caselton, K. J. F. Hall, F. P. D. Navin, A. D. Russell, R. A. Spencer, S. F. Stiemer.

Assistant Professors: J. W. Atwater, R. J. Gray.

U.B.C.'s Department of Civil Engineering offers three Graduate Degree Programs: Master of Engineering (M.Eng.), Master of Applied Science (M.A.Sc.), and Doctor of Philosophy (Ph.D.). In each of these programs, students may select one of the following areas of specialization:
— Coastal and Ocean Engineering
— Construction Management
— Environment and Pollution Control
— Geotechnical Engineering
— Materials (timber, cement and concrete) and Fracture Mechanics
— Structures and Applied Mechanics
— Transportation
— Water Resources, Hydrology and Hydraulics

Master of Engineering (M.Eng.)

This is an advanced professional degree which requires a total of 15 units of course work and a final comprehensive examination. At least 12 units of graduate courses are required of which at least 6 must be in Civil Engineering subjects. No thesis is required for this program.

Full-time students can complete the course work requirements for the M.Eng. degree in two terms (1st term: September to December: 2nd term: January to April).

Master of Applied Science (M.A.Sc.)

This degree requires a minimum of 15 units made up of at least 9 units of course work in addition to the research necessary for a Master's thesis. At least 6 units of graduate courses in Civil Engineering subjects are required.

Full-time students can complete the course work requirements for the M.A.Sc. degree in two terms. (1st term: September to December; 2nd term: January to April). Students in the M.A.Sc. program spend full time on directed research following completion of their course work requirements and during the summer. It usually takes 15 to 20 months of full-time study to complete the course work and thesis requirements of the M.A.Sc. program.

Doctor of Philosophy (Ph.D.)

This research degree is offered in each of the areas of specialization listed above. The Ph.D. program is based on individual objectives with close supervision and consultation with a faculty adviser. The minimum number of course units required beyond the Bachelors degree is 18; however, students generally need about one full year of course work beyond a Master's degree. A Ph.D. dissertation takes another year or two of full-time research work.

Part-time Students

Students may complete either the M.Eng. or the M.A.Sc. degree on a part-time basis; however, part-time students may spread their program over not more than five years. Prospective students for a part-time Master's degree who have not previously been admitted to the Faculty of Graduate Studies must apply for admission by July 31, and, if admitted, should register during the first two weeks in September.

Persons interested in taking advanced graduate courses, but who do not wish to undertake a full graduate degree program, may register on an unclassified (i.e. non-degree) basis. Prospective unclassified students must apply for admission (or renewal of registration) for each academic year by July 31, and, if admitted, should register during the first two weeks of September.

CLASSICS — Ph.D. and M.A. degrees

Professor and Head: Anthony J. Podlecki.

Professors: A. A. Barrett, J. A. S. Evans, James Russell, G. N. Sandy.

Associate Professors: E. A. E. Bongie, H. G. Edinger, P. E. Harding, Shirley D. Sullivan, Robert B. Todd, E. H. Williams.

Assistant Professors: A. S. Dusing, W. J. Dusing.

The thesis for the M.A. and the dissertation for the Ph.D. may be written in the field of Greek Language and Literature, or Latin Language and Literature, or Greek History or Roman History, or Greek or Roman Archaeology, or Ancient Philosophy.

Major essays may be written in any of these fields by students following the M.A. program with Comprehensive Examination. The Comprehensive Examination may be weighted towards Greek or Latin studies without concentrating exclusively on either. Satisfactory knowledge of both Latin and Greek is required; separate graduate degrees in Latin and Greek are not given. Brochures describing the M.A. and Ph.D. programs are available from the Department of Classics.

CLINICAL ENGINEERING — M.Eng., degree

Professor and Director: Charles A. Laszlo.

Adjunct Professor: C. Hershler.

Associate Member: J. A. McEwen, Adjunct Professor, Electrical Engineering.

Clinical Instructors: R. W. Evans, J. R. Heyworth, G. Klein, K. D. Whitmore.

The Master of Engineering degree is offered to qualified engineering graduates who seek to apply engineering principles at an advanced level to patient-care technology in hospitals and other health care institutions. The Clinical Engineering program provides a basic knowledge of the life and health sciences; training in the application of engineering principles to the clinical environment, patient-oriented technology, design and development, safety procedures; skills in administration and communication. The program consists of course work and practical experience in local hospitals.

Prerequisite: Graduation in Engineering. Students are advised to acquire a basic knowledge of biology, organic chemistry and electronics before applying for entry. Students without the formal prerequisite courses should consult the Department or Faculty concerned and the Director of the Clinical Engineering Program.

Courses:

PHED	391	Human Anatomical Systems
BIOL	201	Cell Biology
COMM	323	Human Resource Management I
PATH	375	Introduction to Human Pathology
HCEP	454	Systems and Computer Applications in Medicine
HCEP	533	The delivery of Primary Health Care
APSC	550	Biomedical Measurements and Biomaterials
APSC	552	Clinical Engineering Seminar
APSC	554	Directed Studies in Clinical Engineering
APSC	556	Clinical Engineering Practice

plus at least 5 units of approved graduate level Engineering courses.

COAL RESEARCH CENTRE

Director: A. P. Watkinson (Chemical Engineering).

There are a number of Departments in various Faculties at the University of British Columbia that undertake research and graduate training related to the use of coals. The Coal Research Centre has been established to facilitate and promote the development of research and graduate training related to the use of coal; to foster contacts with industry and government coal research interests; and to supervise the programming of coal research facilities at the University.

The Centre has a Board of Management comprising the Deans of the Faculties with major interests in coal chaired by the Dean of Graduate Studies.

An Advisory Council with representatives from industry, governments and the university has been formed to make recommendations concerning research areas and projects, and graduate programs.

COMMERCE AND BUSINESS ADMINISTRATION — Ph.D., M.B.A. and M.Sc. (Bus. Admin.) degrees

Dean of the Faculty: P. A. Lusztig.

Associate Dean: L. D. Jones.

Associate Dean—Professional Programs: F. H. Siller.

Assistant Dean—Undergraduate Program: C. Vertesi.

Professors: M. J. Brennan, S. L. Brumelle, D. R. Capozza, G. A. Feltham, M. A. Goldberg, G. J. Gorn, D. Granot, F. Granot, N. A. Hall, J. Hughes, T. D. Heaver, A. Kraus, M. D. Levi, P. A. Lusztig, K. R MacCrimmon, J. C. T. Mao, R. V. Mattessich, C. L. Mitchell, V. F. Mitchell, L. G. Mitten, B. Schwab, E. S. Schwartz, W. T. Stanbury, M. Thompson, I. Vertinsky, C. B. Weinberg, D. L. Weiss, W. T. Ziemba.

Associate Professors: M. E. Ace, A. Amershi, D. R. Atkins, R. T. Barth, I. Benbasat, R. E. Blaine, A. E. Boardman, J. A. Brander, J. D. Claxton, P. de Jong, A. S. Dexter, B. C. Fauman, J. D. Forbes, P. J. Frost, G. W. Gau, R. C. Goldstein, G. Gorelik, S. W. Hamilton, L. D. Jones, R. F. Kelly, L. F. Moore, P. N. Nemetz, S. M. Oberg, T. Oum, C. C. Pinder, R. W. Pollay, M. L. Puterman, M. Queyranne, F. A. Siller, B. Spencer, R. Thompson, J. W. C. Tomlinson, D. H. Uyeno, G. A. Walter, J. B. Warren, W. G. Waters, D. A. Wehrung.

Assistant Professors: P. Cheng, G. Chow, A. Dontoh, B. E. Eckbo, J. Graham, R. M. Giammarino, R. L. Heinkel, R. Helsley, P. Hughes, T. Knight, V. Maksimovic, L. D. Marks, D. C. McPhillips, G. A. Richardson, A. Sadanand, V. Sadanand, S. E. Sefcik, D. A. Simunic, R. E. Stablein, N. M. Stoughton, M. W. Tretheway, D. K. C. Tse, A. Verma, W. J. Welch, W. F. J. Wood, J. Zechner.

Lecturers: S. Alisharan, I. Dan's, D. E. C. Dent, R. Fraser, E. L. Gilbart, D. H. Y. Lam, D. B. Lockwood, R. R. Loffmark, D. J. Meredith, G. G. Smeltzer, C. Vertesi.

Instructors: R. M. Davis, D. F. Gardiner.

M.B.A. Degree

The objective of the M.B.A. program is to offer an integrated course of study in Management and Administration and the important cognate disciplines to properly qualified persons holding a Bachelor's degree. Students accepting an offer of admission to the M.B.A. program will be required to pay, at the time of acceptance of the offer of admission, a non-refundable deposit of $100.00 to be applied to the student's first-term tuition. Full time students normally spend two academic years in residence. On a part-time basis candidates may spread the course work over a longer period, provided that all degree requirements are completed within five years of initial registration.

In determining the admissibility of a candidate to the M.B.A. program, no distinction is made between full-time and part-time students.

1st Year of Full-time Studies

Candidates are required to take the following 16 units of prerequisite Core Courses in their first year:

Commerce 311	Decision Analysis
Commerce 313	Quantitative Methods-Analysis
Commerce 323	Human Resources Management I
Commerce 326	Human Resources Management II
Commerce 336	Management Information Systems
Commerce 351	Financial Accounting
Commerce 352	Managerial Accounting
Commerce 361	Marketing Management
Commerce 373	Business Finance
Economics 301	Intermediate Microeconomic Analysis
Economics 302	Intermediate Macroeconomic Analysis

Applicants with university credits in relevant disciplines may, on application, be permitted to write exemption examinations for some of the above courses prior to registration in September. Exemptions will be granted on a course-by-course basis.

Evening First-year Core Courses:

To accomodate part-time students a section of each core course listed above will be offered in the evening between 6:00 p.m. and 10:00 p.m. Monday through Thursday.

2nd Year of Full-time Studies

The fifteen units of graduate courses of full-time studies for credit toward the M.B.A. degree are typically taken in the second year.

The general rules governing the M.B.A. program content provide that:

(a) at least 12 units must be at the 500 level, or above,
(b) at least 9 units must be taken within the Faculty of Commerce and Business Administration,
(c) All students are required to take Commerce 591 and 592 and to pass a comprehensive examination,
(d) to ensure adequate breadth, elective courses have to be selected from at least three different areas of management,
(e) students are required to write a graduating essay.

The graduating essay *shall go beyond the formal course work for the degree, but, where appropriate, may originate in a formal course*. Essays should demonstrate the candidate's ability to organize knowledge with some critical rigour in a form acceptable to the particular profession or academic discipline. The graduating essay carries no unit value.

(f) unless otherwise specified, the minimum prerequisites for all 500 level courses are completion of the first year Core Courses or permission of the instructor.

The M.B.A. is intended to be a general program and narrow specialization is discouraged. The general integrated nature of the M.B.A. program mitigates against the degree of specialized study normally required for a thesis. Students interested in developing a research capability, and in writing a thesis, should consider the M.Sc. program in which it is possible to develop a more specialized course of study.

M.Sc. (Business Administration) Degree

The M.Sc. (Business Administration) degree is intended for graduate students who wish to prepare for specialized careers in the performance of technical and analytical functions in organizations. In contrast to the M.B.A. program whose regulations prevent excessive specialization in any one area of study, the M.Sc. program allows as much concentration in any one field of study as may be consistent with the individual student's educational goals. It is expected that students entering this program will have the objectives of developing analytical and research competence in fields of specialty such as personnel administration, management science, accounting and management information systems, transportation, urban land economics, or market research.

The M.Sc. program normally requires two years of study. The precise number of units required of any individual depends upon the candidate's prior preparation and the number of first-year core courses required varies slightly between divisions.

It is emphasized that there is considerable flexibility in the rules governing the M.Sc. program, and students with specialized interests or with interests which involve work in other Faculties are encouraged to explore the possibility of developing an individual program to suit their special needs.

Degree Program

The program of study for an M.Sc. candidate is determined by an M.Sc. adviser and committee chosen to represent the area of specialization elected by the candidate. The course program will, therefore, differ for each student, will reflect the student's background, and will be developed by the M.Sc. adviser from the resources of the University community so as to best prepare the student for specific career objectives.

The M.Sc. program normally consists of a thesis (Comm. 549) of 3 units plus 12 units of graduate credits in addition to the other course work prescribed for the field. The 12 units of course credits shall consist of at least 9 units at the 500 level or above, and no more than 3 units at the 300 or 400 levels.

Applicants who may be concerned about the proper choice of degree programs at the time of initial application may be assured that transfers from the M.B.A. to the M.Sc. program are possible, since the initial admission criteria are the same. However, students transferring from the M.Sc. to the M.B.A. program must satisfy the prerequisite course requirements for that program.

At the time of acceptance of an offer of admission to the M.Sc. (Business Administration) program, students will be required to pay a non-refundable deposit of $100.00, which will be applied to the first-term tuition fees.

Combined LL.B./M.B.A. Degree

A limited number of students may be admitted to a program in which the degrees of M.B.A. and LL.B. may be completed in four winter session and a spring or summer session. See "LL.B./M.B.A. combined degree program" for further information.

Ph.D. Degree

General

The objectives of the Ph.D. program in Business Administration are to prepare appropriately qualified individuals for university teaching and for research positions in business and government. The degree of Doctor of Philosophy is the highest conferred by the University and is a research degree requiring general proficiency and distinctive attainment in a special field as well as an ability for independent investigation, evidenced by a dissertation based upon original research and creative scholarship.

Five divisions of the Faculty of Commerce and Business Administration presently offer approved programs of study leading to the Ph.D. degree. These are:

Accounting and Management Information Systems
Finance
Management Science
Marketing
Organizational Behaviour

Within each of these general areas a variety of special fields may be studied. In addition, a student may pursue a cross-field program in the Faculty of Commerce and Business Administration or apply to the Faculty of Graduate Studies as an Interdisciplinary candidate for the Ph.D. degree. These alternatives allow specialization in such areas as Transportation, Urban Land Economics, International Business or Policy Analysis, as well as programs of study which cross department or Faculty boundaries and which allow, for example, study in the Institute of Applied Mathematics combined with study in Management Science.

Since each candidate enters the program with a unique academic background and pursues a course of study which reflects the candidate's own special interests, it is possible to give only very approximate estimates of the time which may be necessary to complete the major phases of the program. However, doctoral work beyond the master's degree in business administration or its equivalent ordinarily involves about two years of formal course work, and, up to one additional year may be required of students who lack the preparation for business studies, or, in the case of Management Science, who lack the necessary preparation in mathematics and statistics. The thesis research normally requires a year or more of additional work.

Students with limited financial resources should not be discouraged from applying for admission to the Ph.D. programs, since all students who are admitted, but who have not obtained financial assistance from an external source will have access to some form of financial support.

Program of study for the Ph.D. Degree

The program of study for each entering Ph.D. student is determined by a faculty committee drawn from the area of specialization, in consultation with the student. In those divisions with individual Ph.D. programs, a standing committee has been appointed to supervise the early work of new candidates, which transfers its responsibility to a committee more closely representing the special research interests of the candidate as they develop. Applicants are encouraged to correspond with the Ph.D. advisers in their chosen fields of study (prior to entry), who will be glad to give information about the specific requirements of their area upon request. Such enquiries may be addressed initially to the Director of the Ph.D. program, who will forward them to the appropriate faculty advisers.

The major phases of the program are as follows:

(i) a basic core of suitable courses from the foundation areas of business research, including mathematics, statistics, economics, sociology and psychology, whose concepts and methods may be applied in research and in the process of decision-making.
(ii) a basic core of study of the management decision areas, which are defined to include subjects such as A.M.I.S., Finance, Organizational Behaviour and Marketing.
(iii) a written Preliminary Examination on the above, supervised by a Faculty committee, in foundation courses in which the candidate receives less than a first class mark.
(iv) a study of the chosen field of specialization, including a knowledge and understanding of the literature of the field, the basic concepts, their origins, evolution, and relationship to cognate fields, and the application in the chosen field of advanced methods of research.
(v) a written comprehensive examination in the field of specialization.
(vi) a formal thesis proposal, presented at an open workshop or seminar, and approved by the appropriate thesis committee.
(vii) a scholarly thesis supervised by the thesis commmittee.
(viii) an oral examination in defence of the completed thesis.

In the Management Science Program, the study defined in (i) and (ii) is replaced by an intensive preparation in mathematical and statistical methods.

In some areas of specialization the defined special field of study will include a minor field of interest, and in the Management Science Program two minor fields are mandatory. Please refer to the relevant section for the guidelines used in some of the option areas.

THE SCHOOL OF COMMUNITY AND REGIONAL PLANNING

(See appropriate section of Calendar)

COMPARATIVE LITERATURE — Ph.D. and M.A. degree

Chairman: Lorraine Weir (English).

Committee: E. Barrett (Classics), K. Burridge (Anthropology-Sociology), A. Busza (English), M. Chiarenza (Hispanic and Italian Studies), A. Globe (English), S. Guilbaut (Fine Arts), K. Hansen (Asian Studies), B. Heldt (Slavonic Studies), P. Loeffler (Theatre), E. Pulleyblank (Asian Studies), P. Sarkonak (French), A. Urrello (Hispanic and Italian Studies).

M.A. Degree:

Requirements for Admission:

Fluency in one foreign language (i.e., at least three language courses and two literature courses taken in this language at the undergraduate level or the equivalent), and an acceptable knowledge of a second foreign language. (Students whose qualifications are doubtful will be required to take a reading examination in the language.)

Requirements for the degree:

A student's program must be arranged in consultation with and approved by the Comparative Literature Committee. The normal M.A. program will consist of 15 units. Students may opt for an M.A. with thesis or without thesis.

Requirements for the M.A. with thesis: course work (12 units); thesis (3 units); oral examination on the thesis and on the the M.A. Reading List. The thesis must be on a comparative topic, i.e. it must concern works in at least two literatures, studied in the original.

Requirements for the M.A. without thesis: course work (15 units); written and oral examination on the M.A. Reading List, and a major comparative essay.

Ph.D. Degree:

The course of study will normally take three years, with a Qualifying Examination during the first year, Comprehensive Examination at the end of the second year, and the writing of the Ph.D. Thesis during the third year.

Each student will elect one literature as a major and two or three literatures as minor fields of study. All of these literatures will be studied in the original language. (A student will not be able to count two literatures in the same language as two separate fields.) Between one-third and one-half of the student's work will be in the major area of study; the proportions between the minors will be variable. Each student will thus have a comprehensive knowledge of one literature; the minor fields of study in other literatures will be related to it principally in a selective and comparative way, within a given period or genre or with reference to a particular topic or problem, although relevant background knowledge of the minor literatures will be expected. During the course of the first year, each student, in consultation with faculty advisers and with a view to the eventual thesis area, will prepare a reading list on which the Comprehensive Examination will be based.

Requirements for Admission:

Literatures: An M.A. or its equivalent in Comparative Literature or in a single language and literature. In either case, evidence of advanced work in at least two literatures in the original will be required.

Languages: Competence in two or three languages other than the candidate's native language will be required. This competence will be judged by existing credentials in the first instance, but will be tested during the student's first year of study.

Requirements for the Degree:

Language Requirement: During the first year of study, a candidate will be expected to demonstrate competence in the language of the major and minor literatures, through performance in course-work, and through performance in part of the Qualifying Examination. In special cases, the Committee may require a translation test, or the taking of a language course.

Qualifying Examination: During the first year of study, a candidate will have to pass a Qualifying Examination designed to test intellectual and linguistic capacity for work in Comparative Literature at the doctoral level.

Course Work: A student will normally take 9 units of graduate-level courses in the first year of the Program. Further courses may be required where appropriate.

Comprehensive Examinations: The Comprehensive Examinations (normally at the end of a student's second year) will be based on the reading list to be prepared before the end of the student's first year.

COMPUTER SCIENCE — Ph.D., and M.Sc. degrees

Professor and Head: J. M. Varah.

Professors: P. C. Gilmore, J. M. Kennedy, A. K. Mackworth.

Associate Professors: H. D. Abramson, U. M. Ascher, S. T. Chanson, J. R. H. Dempster, D. G. Kirkpatrick, R. S. Rosenberg, P. J. Voda, R. J. Woodham (joint appointment with Forestry).

Assistant Professors: K. R. Abrahamson, W. S. Havens, A. M. Kanda, S. T. Vuong.

Honorary Professor: A. G. Fowler.

Honorary Associate Professor: G. F. Schrack.

The Department offers opportunities for advanced study leading to the M.Sc. and Ph.D. degrees. Fields of study include Programming Languages, Artificial Intelligence (Computational Vision and Natural Language Processing), Numerical Analysis, Theory of Computation, Computer Communications, and Distributed Systems. The Department maintains a VAX11/780, 2 VAX 11/750's, 9 SUN workstations, an Imagen Laser Printer and Apple Laser Writer, 1 TI-990, and 3 PDP-11s, a Comtal Vision I image processing system, an Optronics film scanner/writer, and an Ethernet local area network. The facilities of the University Computing Centre are also available; these include two large Amdahl systems with a full range of terminal facilities.

Detailed information on program requirements, courses, and financial assistance is available from the Department on request.

CENTRE FOR INTEGRATED COMPUTER SYSTEMS RESEARCH

Director: To be appointed.

The Centre for Integrated Computer Systems Research has been established to facilitate and foster research and graduate training related to computer and information systems. The Centre encompasses research in Computer Communications and Systems, VLSI Design, Artificial Intelligence and Computational Vision, Logic Programming, Robotics and Telecontrol, Computer Geometry and Graphics, and Numerical Computation. Emphasis is placed on interdisciplinary studies. The Centre actively promotes closer links with the computer and telecommunication industry as well as external organizations interested in the application of computer technology.

The Centre has a Management Committee consisting of the Dean of Graduate Studies (Chairman), the Deans of Science and Applied Science, the Head of Computer Science and one additional person nominated by the Dean of Applied Science.

A Technical Advisory Committee with representation from industry, government and the University will be formed to make recommendations concerning research projects and graduate programs.

CREATIVE WRITING — M.F.A. degree

Professor and Head: George McWhirter.

Professors: Robert Harlow, Jacob Zilber.

Associate Professor: Sue Ann Alderson, C. J. Newman.

The Department offers a two-year course of resident study designed to help the talented student become a productive writer. A reduction of the second year resident requirement will be considered in exceptional circumstances. The program is based on the premise that capable student authors can benefit from judicious criticism and the requirement to produce work regularly, according to deadlines. Workshops, conferences and tutorials are designed to focus attention on the student's poetry, fiction, drama and literary translation. M.F.A. degrees are offered in Creative Writing and in Creative Writing/Theatre for playwrights. The latter is designed for advanced playwrights who must be accepted by both departments. The department may approve literary translation as a focus for some students. All candidates are selected on the basis of work submitted. Reading assignments may be given in various books and journals, including *Prism International*.

During the two years, 18 units of work, including a thesis, will qualify the student for the M.F.A. degree. Candidates will complete a program constituted in the following manner:

Three or more of the following areas of writing, chosen in consultation with the departmental adviser, except for playwrights in the Creative Writing/Theatre M.F.A. program:

503. Advanced Writing of Children's Literature.
504. Advanced Writing of Radio Plays.
505. Advanced Writing of Imaginative Non-Fiction.
506. Advanced Writing of Screen and Television Plays.
507. Advanced Writing of Stage Plays.
508. Advanced Writing of the Novella or Novel*.
509. Advanced Writing of Short Fiction*.
510. Advanced Writing of Poetry.
515. Advanced Workshop in Translation.
521. Editing and Managing a Literary Magazine**.
539. Advanced Projects in Creative Writing**.
547. Directed Reading (may not be offered every year)**.
549. Thesis.**

*508 and 509 treated as a single genre — fiction.

**Not counted as a genre.

In the second year, candidates will complete a 3 unit thesis (549) consisting of a book-length work in the area(s) of their special interest. A thesis designed for

screen, television or radio should be ninety minutes in running time. The thesis may be a substantial revision and extension of work done during the first year. Playwrights in the Creative Writing/Theatre M.F.A. are required to write the equivalent of a full-length play acceptable to both Departments and to be involved in the staging or production of some of their work. Students with the required ability and linguistic knowledge may fulfil the thesis requirement for the M.F.A. in Creative Writing with a work of Translation. (M.A. candidates in Comparative Literature who have their adviser's permission and are accepted by the instructor of the course in translation may include a translation in partial satisfaction of their thesis requirements.)

Students may be required to take advanced creative writing undergraduate courses and tutorials as part of their program.

Applications are received throughout the year but the deadline is December 1st. Candidates should submit 75 to 100 pages of work in two or more of the genres listed above, specifying which is their major area of interest. Candidates who intend to focus on translation should submit 75 to 100 pages consisting of translated material in any of the above genres and a sample of their own original creative writing.

A detailed brochure is available on application to the Department.

DENTAL SCIENCE — M.Sc. Degree (See also ORAL BIOLOGY — Ph.D. Degree)

Professor and Dean: G. S. Beagrie.

Professors: D. M. Brunette, D. Donaldson, P. R. Dow, A. G. Hannam, T. J. Harrop, L. Kraintz, A. A. Lowe, B. C. McBride, A. L. Ogilvie, C. Price, A. S. Richardson, W. A. Richter, R. H. Roydhouse, J. Tonzetich, D. J. Yeo.

Associate Professors: B. Blasberg, M. A. Boyd, V. M. Diewert, T. Gould, M. I. MacEntee, E. Puil, M. Reitzik, R. M. Shah, J. G. Silver, A. E. Swanson, W. W. Wood.

Assistant Professors: G. Derkson, J. Karp, G. Gibson, R. W. Priddy, J. D. Waterfield.

Program:

The Faculty of Dentistry offers facilities and opportunities for advanced study leading to the degree of M.Sc. in Dental Science. Candidates will be accepted under the general regulations of the Faculty of Graduate Studies to study in one of the major recognized fields of dentistry, and the program will ordinarily require two full academic years. Students accepting an offer of admission to the M.Sc. program, at the time of acceptance of admission are required to pay a non-refundable deposit of $100.00 to be applied towards the student's first-term tuition.

The program also provides an opportunity for qualified students to enter a combined specialty degree program which will lead both to certification in Periodontics (for which a Diploma is awarded), and an M.Sc. in Dental Science. The application deadline for the combined program is September 1.

An essential prerequisite is the prior completion of undergraduate courses in the subject at least equivalent to those offered in the Dental Undergraduate Program.

A program of part-time graduate studies is also available.

ECONOMICS — Ph.D. and M.A. degrees

Professor and Head: S. P. S. Ho.

Professors: G. C. Archibald, C. Blackorby, P. G. Bradley, J. G. Cragg, W. E. Diewert, D. J. Donaldson, R. G. Evans, J. F. Helliwell, S. P. S. Ho, J. R. Kesselman, T. Lewis, G. R. Munro, K. Nagatani, P. A. Neher, D. G. Paterson, G. Rosenbluth, A. D. Scott, R. A. Shearer, R. S. Uhler, T. J. Wales, R. M. Will.

Associate Professors: R. C. Allen, M. Eswaren, G. B. Hainsworth, W. C. Riddell, J. Weymark, K. J. White, W. E. Schworm.

Assistant Professors: J. D. Boyd, B. Copeland, D. A. Glassman, S. Jones, A. Kotwal, H. M. Neary, A. Redish, M. Slade.

The program leading to the degree of Master of Arts is designed to prepare the student for employment in business or government or to serve as a first stage in a program leading to the Ph.D. degree. The studies leading to the degree of Doctor of Philosophy are designed to equip the student to carry out research, with a view toward a career in university teaching, business or government. With a faculty of 40 members, the Department of Economics is able to offer courses and seminars and to supervise research in a wide variety of subjects. Among others these include economics of natural resources, growth theory, economic development, micro-economic theory and macro-economic theory and policy, money and banking, economic history, econometrics, international trade and finance, industrial organization, medical economics, public finance, industrial relations, and labour economics.

The University Library's holdings in economics are particularly extensive in serial publications and the postwar literature. Graduate students also use the special collection of the Economics Reading Room, which contains the principal professional journals and frequently-used books. Special research facilities include the University Computing Centre and Arts Computing. Arts Computing offers guidance and assistance to faculty members and graduate students conducting quantitatively-oriented research in the social sciences. Its library of frequently-used machine programs is constantly being expanded. The services of programmers and keypunch operators are available through Arts Computing.

A listing and description of the courses offered each year are contained in a detailed brochure available on application to the Department.

EDUCATION—Ed.D., Ph.D., M.Ed. and M.A. degrees

Professor and Dean of the Faculty: Daniel R. Birch.

Professors: C. J. Anastasiou, J. H. M. Andrews, M. Arlin, P. Arlin, T. R. Bentley, S. S. Blank, W. B. Boldt, R. Boshier, C. J. Brauner, J. Catterson, F. G. Chalmers, B. R. Clarke, A. E. Clingman, J. R. Coombs, M. Csapo, L. Daniels, J. D. Dennison, L. W. Downey, V. D'Oyley, M. Foster, J. Friesen, T. Goldberg, J. U. Gray, L. Greenberg, W. Griffith, R. J. Hills, I. E. Housego, R. Jarman, R. G. Jones, J. W. Kehoe, D. C. Kendall, M. Lazerson, S. S. Lee, R. MacGregor, T. D. M. McKie, D. Milburn, B. Munro, O. A. Oldridge, D. Robitaille, S. M. Rogow, K. Rubenson, J. Sherrill, E. G. Summers, J. N. Sutherland, G. C. Trowsdale, J. Wallin, J. D. Wilson.

Associate Professors: J. Allan, D. E. Allison, N. Amundson, M. Ashworth, D. A. Bain, I. Beattie, W. A. Borgen, D. J. Brown, W. Bruneau, R. Chester, L. Cochran, R. F. Conry, M. Crowhurst, C. K. Curtis, M. Elliott, G. Erickson, D. Fisher, J. Gaskell, Jane Gaskell, S. Kahn, G. Kelsey, P. Koopman, R. Leduc, P. Leslie, W. Logan, S. E. Marks, B. Mohan, A. J. More, J. Murray, R. Neufeld, D. T. Owens, G. Pennington, F. Pieronek, M. Ralston, K. Reeder, D. C. Rodgers, T. Rogers, R. R. Roy, G. Selman, K. Slade, G. J. Spitler, R. Staley, R. Steele, N. S. Suzuki, W. Szetela, D. C. Thomas, C. S. Ungerleider, P. A. Vertinsky, L. L. Walters, W. Werner, T. I. Westermark, M. Westwood, D. Whittaker, D. C. Wilson, S. Wong, J. Woodrow, I. Wright, R. Young.

Assistant Professors: K. Adam-Moodley, J. Belanger, S. Butler, P. Buttedahl, R. Carlisle, J. L. Conry, T. Cook, S. Davies, D-F. Der, G. T. Dixon, F. Echols, T. Fleming, E. G. Fiedler, H. Goelman, E. Goetz, P. Grimmett, L. Gunderson, B. Horodezky, B. Housego, R. Jobe, V. Kirkness, D. Livingstone, A. Lukasevich, H. Polowy, R. Poutt, D. D. Pratt, M. Rainey, H. Ratzlaff, J. Shapiro, G. Snyder, T. J. Sork, C. Staab, W. Sutton, J. E. Thornton, R. J. Tolsma, L. Travis, P. Verriour, R. Watson, M. Westrom, C. I. Williams, D. Willms, M. A. Winzer, L. Woolsey.

Graduate Programs in Education

Graduate degrees in Education—the Master of Arts, the Master of Education, the Doctor of Education and the Doctor of Philosophy are offered through the Faculty of Graduate Studies. For information on admission and study requirements direct enquiries to the Office of Graduate Programs and Research in the Faculty of Education (OGPR).

The following is a list of the areas of study within the Faculty of Education in which a student may complete a graduate program:

1. Administrative, Adult, and Higher Education
   - Adult Education*
   - Educational Administration*
   - Higher Education
2. Counselling Psychology
   - Counselling Psychology*
3. Educational Psychology and Special Education
   - Educational Psychology
   - Human Learning, Development and Instruction*†
   - Measurement and Evaluation
   - School Psychology*
   - Special Education*
4. Social and Educational Studies
   - Comparative Education
   - History of Education
   - Philosophy of Education
   - Social Foundations of Educational Policy†
   - Sociology of Education
5. Curriculum and Instruction
   - Art Education
   - Business Education
   - Early Childhood Education
   - Elementary Education
   - English Education
   - General Curriculum and Instruction*
   - Industrial Education
   - Mathematics Education*
   - Modern Language Education
   - Music Education*

Reading Education*
School Librarianship
Science Education*
Social Studies Education
Teacher Preparation (P.E.)

Ed.D. programs are offered in the areas indicated by an asterisk(*). Also, it is possible to offer the Ed.D. program in General Curriculum and Instruction with a specialization in a curriculum area in most subjects or areas taught in schools. (For further information, contact OGPR.) Ph.D. programs are offered in the areas indicated by (†).

Where appropriate, joint programs can be arranged which involve collaboration among the areas listed above, or which involve an area outside the Faculty of Education.

Off-Campus Graduate Work

It may be possible for the Faculty of Education to organize graduate programs which have off-campus components offered at locations throughout B.C.

For further information, contact the Office of Graduate Programs and Research, Faculty of Education.

N.B.: Not all graduate Programs are offered in a given year.

ELECTRICAL ENGINEERING—Ph.D., M.A.Sc. and M.Eng. degrees

Professor and Head: K. D. Srivastava.

Professors: M. P. Beddoes, E. V. Bohn, H. W. Dommel, R. W. Donaldson, E. V. Jull, M. M. Z. Kharadly, A. D. Moore, C. A. Laszlo, P. D. Lawrence, D. L. Pulfrey, A. C. Soudack, L. M. Wedepohl, Lawrence Young, Y-N. Yu (Emeritus).

Associate Professors: M. S. Davies, M. R. Ito, C. S. K. Leung, G. F. Schrack, R. K. Ward.

Assistant Professors: W. G. Dunford, H. W. Lee, M. D. Wvong.

Adjunct Professors: I. G. Cumming, G. A. M. Dumont, J. L. Fikart, R. H. S. Hardy, J. A. McEwen, L. A. Snider.

Prerequisites—Graduation in Electrical Engineering, Engineering Physics, Physics, Computer Science or other related subjects. Some students may be required to supplement their graduate studies by taking certain undergraduate courses in Electrical Engineering. Alternatively, interdisciplinary degrees may be appropriate and can be arranged.

Facilities are provided for research in: applied electromagnetics; biomedical engineering; communications and signal processing; computers and computer applications; digital system design and software engineering; power systems and power electronics; solid state; systems and control.

Qualified students are admissible to programs leading to degrees of M.A.Sc. and M.Eng. on a part-time basis.

Ph.D. Degree:

Course—Includes a thesis and 12 units of approved courses. For those holding a Master's degree or transferring from a Master's program, appropriate credit will be given for courses completed.

M.A.Sc. Degree in Electrical Engineering

Course—A thesis plus (as a minimum) the University requirement of 9 units of approved courses, 6 of which must be at the 500 level. Normally at least 3 of the 9 units will be taken in this Department, 6 units for students with degrees in subjects other than electrical engineering.

M.Eng. Degree:

The degree of M.Eng. may be obtained on the basis of the completion of 15 units of course work together with an essay or report and a comprehensive examination. This degree is intended mainly for candidates who may wish to extend their knowledge after a period of engineering practice following first graduation.

Students should consult the Department for information regarding courses to be offered.

ENGINEERING PHYSICS—M.A.Sc. degree

See Physics

ENGLISH—Ph.D. and M.A. degrees

Professor and Head: I. S. Ross.

Graduate Committee Chairman: J. F. Hulcoop.

Professors: K. Alldritt, E. Durbach, W. E. Fredeman, M. K. Goldberg, E. B. Gose, W. F. Hall, J. F. Hulcoop, R. W. Ingram, L. M. Johnson, R. M. Jordan, J. A. Lavin, M. A. Manzalaoui, P. Merivale, I. B. Nadel, W. H. New, G. E. Powell, I. S. Ross, P. G. Stanwood, D. G. Stephens, J. L. Wisenthal.

Associate Professors: R. W. Bevis, M. A. H. Blom, T. E. Blom, F. Bowers, A. Busza, G. Creigh, A. B. Dawson, D. L. Evans, J. W. Foster, A. V. Globe, G. Good, S. E. Grace, B. L. Grenberg, J. A. Hart, R. B. Hatch, J. H. Kaplan, E. R. Labrie, E. P. Levy, A. A. Lunsford, W. Messenger, R. Nemser, A. T. L. Parkin, P. A. Quartermain, R. L. Ricou, H. J. Rosengarten, S. W. Stevenson, J. F. Stewart, K. Stockholder, B. Sylvester, W. Tallman, J. Wasserman, M. L. Weir, L. M. Whitehead, G. R. Wieland, F. H. Whitman, J. D. Wigod.

Assistant Professors: L. J. Brinton, D. Brydon, J. R. Doheny, F. James, N. J. Johnson, R. C. Johnson, J. K. Kealy, M. H. Kirkley, E.-M. Kröller, J. Lepage, M. Nicholson, R. G. Seamon, F. E. Stockholder, C. Tapping, P. A. Taylor, W. E. Yeomans.

The Department offers opportunities for advanced study in English, American, Canadian, and Commonwealth literature, and in English language including rhetorical topics. The graduate teaching staff numbers approximately 70, and the Library has good working collections in most areas and particularly strong collections of periodicals, Burns materials, modern Irish Literature, Canadiana, and—in the Colbeck Collection—nineteenth-and early twentieth-century English literature. Seminars are offered annually in the major periods, figures, and genres. Details of the seminars to be offered are given in the Department's brochure, *English Courses Offered. For detailed requirements concerning the M.A. degree, with or without thesis, the Ph.D. program and the possibility of part-time study for the Master's degree, students should consult the Departmental Graduate Handbook.*

ETHNIC STUDIES

Chairman: John R. Wood (Political Science)

Ethnic Studies refers here to work on ethnic relations in the context of the multicultural nature of Canadian society. Work is normally centred on a single ethnic group, on relations between ethnic groups, or on a comparison of the Canadian situation with that in other countries. Such studies involve numerous disciplines, e.g., history and political science, anthropology and sociology, language and literature, health and education, and are carried on in various departments, schools and faculties within the university. Subjects may range widely, for example, from ethno-musicology to nutrition, and are frequently studied on an interdisciplinary or inter-faculty basis.

Although there is no Department of Ethnic Studies at U.B.C. and no formal program leading to a degree in this field, many departments throughout the university offer courses relevant to Ethnic Studies and related areas. A student wishing to specialize in Ethnic Studies at the graduate level will normally be located in a single department and follow a normal degree program. Such students should therefore consult the Committee on Ethnic Studies for guidance in planning their coursework. This should be done at the time of applying for admission to the Faculty of Graduate Studies.

Resources and departmental course offerings are adequate to support some ethnic studies programs at the graduate level and funds are available from a variety of sources to support research projects. The Committee should be consulted for details.

FAMILY AND NUTRITIONAL SCIENCES

(See programs in **FAMILY STUDIES** and **HUMAN NUTRITION**)

FAMILY STUDIES (School of Family and Nutritional Sciences) — M.A. degree

Professor and Director: Roy H. Rodgers.

Professor: Daniel Perlman.

Associate Professor: Margaret Arcus.

Assistant Professors: Phyllis J. Johnson, Carol L. Martin, Eleanore L. Vaines, James White.

The Division of Family Science of the School of Family and Nutritional Sciences offers opportunities for advanced study in the family. The M.A. program in Family Studies is intended to equip graduates with the competency to advance knowledge as well as to apply that knowledge in a variety of community settings. The program is interdisciplinary in nature, stressing work in the behavioural sciences relevant to the family.

Admission

Applicants must satisfy the normal admission requirements of the Faculty of Graduate Studies and must have completed an appropriate degree in Home Economics, Education or one of the social sciences with some undergraduate courses in the area of the family. The admissions committee will make individual judgements concerning other prospective students who do not meet these requirements but who may be admitted contingent upon making up deficiencies. In all cases, preference will be given to those having a substantial background in the social sciences. Applicants should note that Family Studies 522 requires previous completion of a course in behavioural research methods and Mathematics 203 or equivalent.

M.A. Degree: The Master's degree program requires a minimum of 15 units of course work, of which at least 9 units must be at the 500 level including the required core courses Family Studies 520 *The Canadian Family in Historical and Cultural Perspective*, and Family Studies 522 *Research Seminar in Family Studies*. Elective courses of at least 6 additional units selected from the Faculty of Arts, the Faculty of Education, the School of Family and Nutritional Sciences, the School of Social Work, or (with specific justification) other Faculties or Schools, which form a coherent plan of study, compose the remainder of the course work. In addition to the formal course work, as evidence of research and scholarly capability, a thesis (3-6 units) is required.

FINE ARTS—Ph.D., M.A. and M.F.A. degrees

Associate Professor and Head: James O. Caswell.

Professors: Roy Kiyooka, George Knox, Geoffrey Smedley.

Associate Professors: Marvin Cohodas, Serge Guilbaut, Rhodri Windsor Liscombe, Mary Morehart, Debra Pincus, Richard Prince, David Solkin, Robert Young.

Assistant Professors: Wendy Dobereiner, Moritaka Matsumoto, Barbara Sungur, Judy Williams.

Instructors: Marc Pessin, Doreen Walker.

The Department offers opportunities for advanced study of art history in the major periods of European and North American art, in certain areas of Asian art, and the indigenous arts of the Americas leading to the Ph.D. and M.A. degrees. It also offers advanced studies in studio work, leading to the M.F.A. degree.

The region offers good collections of modern Canadian painting, sculpture and architecture, and relatively rich collections of Asian art and the indigenous arts of the Americas. The Fine Arts Division of the Library has holdings of some 100,000 books and over 400 current periodicals, and can support advanced research in all areas.

Graduate students are encouraged to travel during their graduate work, to gain wider first-hand experience of the works of art with which they are concerned and the sources of information relating to them.

M.A. Program

The M.A. in art history requires 12 units of course work (including a minimum of 6 units at the 500-level), a 3-unit thesis and a reading knowledge of two languages other than English.

M.F.A. Program

The program is primarily limited to painting, printmaking and sculpture. Training in applied art, commercial art and design, photography, film and television is excluded.

M.F.A. applications will be considered from:

1. Persons holding a B.F.A., B.A. or B.Ed. degree with a major in Fine Arts and who satisfy the requirements for admission to Graduate Studies.
2. In exceptional circumstances persons who contend that their background is of equal merit.

The main consideration governing the admission of applicants to the program will be the assessment of work which is submitted as a part of the application, but other materials also will be taken into account.

If an applicant has not done a minimum of nine units of academic credit (i.e. non-studio) at the 300-level or above at U.B.C. with at least Class 2 standing in each, or the equivalent elsewhere, he/she will be considered for admission to the M.F.A. program only when this academic requirement has been satisfied.

The M.F.A. program requires two academic years of course work and, no less than two calendar years and no more than five years after initial registration in the program, a final presentation. The specific requirements are as follows:

1. Fine Arts 581 (6) and Fine Arts 582 (6). These two courses constitute an integrated, two-year studio program worked out for each student by the staff of the Department in consultation with the student, leading to the final presentation.
2. Academic courses, numbered 400 or above, carrying a total of 6 units of credit.

The final presentation of the M.F.A. program will be offered by the candidate at an agreed time and place. This must demonstrate to the satisfaction of the faculty the candidate's capacity for independent creative work and must be accompanied by a full written statement of the candidate's intellectual interests and working procedures.

Ph.D. Program

The Ph.D. in art history is open to well-qualified candidates who can outline a program which takes full benefit of available resources and faculty.

Brochures giving details of each program, descriptions of courses and other information are available from the Departmental office.

FISHERIES—(See Animal Resource Ecology)

FOOD SCIENCE—Ph.D. and M.Sc. degrees

Professor and Head: William D. Powrie.

Professors: Shuryo Nakai, James F. Richards, Philip M. Townsley, Marvin A. Tung.

Associate Professors: Brent Skura, John Vanderstoep.

The Department offers opportunities for advanced study in the fields of food chemistry, physical bromatology and structural bromatology, environmental bromatology and food process science. Fundamental studies may be undertaken on any of the major food systems. The Department is particularly well-equipped for research in the areas of single cell culture, fermentation, chemical identification and reaction, microstructure, rheological properties and sensory evaluation of foods. Equipment available to graduate students includes an electron microscope, an amino acid analyzer, ultracentrifuge capable of sedimentation analysis, electrophoretic and chromatographic analysis equipment, differential thermal analyzer, recording spectrophotometer, Gammacell 220 irradiator, Haake viscometer, Allo-Kramer shear press, rheogoniometer, fermenter and incubators, a freeze-dryer and standard pilot plant equipment. The Library holdings in Food Science are extensive and include all major serials and reference works. In addition the Library has a particularly strong collection in the supporting Sciences.

Further information may be obtained by writing to the Head of the Department.

FORESTRY—Ph.D., M.F., M.Sc., and M.A.Sc. degrees

Professor and Dean: R. W. Kennedy.

Professor and Director, Forestry Graduate Studies: J. W. Wilson.

Professors: T. M. Ballard, J. D. Barrett, Frederick L. Bunnell, J. P. Kimmins, Antal Kozak, D. P. Lavender, Donald D. Munro, P. A. Murtha, T. G. Northcote, Laszlo Paszner, P. H. Pearse, F. L. C. Reed, J. Harry G. Smith, Oscar Sziklai, J. Vincent Thirgood, G. F. Weetman.

Associate Professors: Alan D. Chambers, J. P. Demaerschalk, Peter J. Dooling, D. L. Golding, David Haley, J. A. McLean, Bart J. van der Kamp, R. J. Woodham, John G. Worrall, G. Glen Young.

Assistant Professors: M. C. Feller, A. F. Howard, P. L. Marshall, P. A. Miller, D. E. N. Tait, Leonid Valg.

Ph.D. degree

Opportunities are offered for advanced study in certain fields concerned with the basic scientific, managerial or economic aspects of forestry. The Faculty of Forestry also co-operates with other departments in offering advanced work in such fields as forest ecology, forest economics, forest genetics, forest hydrology, forest pathology, forest entomology, forest soils, forest recreation, forest range management, tree physiology, wood anatomy, wood products, chemistry, engineering and physics, wildlife biology and remote sensing.

M.F. degree

In major branches of Forestry, including biometrics, ecology, economics, entomology, fire control and use, tree breeding, forest hydrology, harvesting, land management, mensuration, operations research, pathology, photo interpretation, tree physiology, products, range management, recreation, remote sensing, resource management, silvics, silviculture, soils, timber management, wildlife management, and wood science, wood products and engineering.

Prerequisite: Bachelor's degree equivalent to the B.S.F., or B.A.Sc in Forest Engineering, of the University of British Columbia.

M.F. Course: Thesis, counting at least 3 units, at least 3 units chosen from graduate courses in the Faculty, including Forestry 545 or 584, and other courses to complete the requirements. Alternatively, the Program with Comprehensive Examination may be taken without Thesis as described under "Courses of Study".

M.Sc. degree in fields as noted above for the Ph.D. degree.

Prerequisite: Graduation in Science, Applied Science, Agricultural Sciences, Social Science, or Forestry.

M.Sc. Course: Thesis, counting at least 3 units, at least 3 units chosen from graduate courses in Forestry, including Forestry 545 or 584, and other approved courses appropriate to the field of study. Alternatively, the Program with Comprehensive Examination may be taken without Thesis.

M.A.Sc. degree

Prerequisite: B.A.Sc. or higher degree in Engineering.

M.A.Sc. Course: Including at least 3 units chosen from graduate courses in Forestry, at least 3 units chosen from the 300, 400, or 500 series in a department of Applied Science, and other approved courses.

Formal lecture courses or seminars are indicated by a single unit value assigned to them. In all problem and research courses, as indicated by a variable number of units, individual laboratory or field investigations or reviews of literature are usually planned to serve the special interests of individual students. When several students have a similar interest in advanced study, formal lectures or seminars may be given.

The staff members listed with the graduate courses are responsible for course administration through the Director of Forestry Graduate Studies. Staff members

other than those listed may direct studies in specialized topics for interested students, on recommendation of the Director.

The Western Laboratory of Forintek Canada Corp located on the campus, co-operates in respect to facilities, special equipment and research direction.

FRENCH—Ph.D. and M.A. degrees

Professor and Head: Laurence L. Bongie.

Professors: Dominique Baudouin, Frank R. Hamlin, Harold C. Knutson, David J. Niederauer, Ruth L. White.

Associate Professors: Rae S. Baudouin, Claude P. Bouygues, David Highnam, Francoise Iqbal, Alistair R. MacKay, Edward J. Matte, Valerie Raoul, David Rogers.

Assistant Professors: Réjean Beaudoin, E. Bruce Carpenter, Olga Cragg, Hervé Curat, Heather Franklyn, Richard G. Hodgson, Richard G. C. Holdaway, Gordon D. McGregor, James Panter, Ralph Sarkonak, Floyd B. St. Clair.

The Department of French offers opportunities for advanced study in the language and literature of France, French Canada and French Africa. For a detailed outline of specific Ph.D. and M.A. programs and information about library resources, write to the Graduate Adviser of the Department.

Courses and Seminars

As early as possible the Department makes available a list of courses to be offered, usually in February of the preceding academic year.

GENETICS—Ph.D. and M.Sc. degrees

Advisory Committee on Genetics

Chairman: W. R. McMaster (Medical Genetics).

Professors: P. A. Baird (Medical Genetics), P. P. Dennis (Biochemistry), A. J. F. Griffiths (Botany), O. Sziklai (Forestry).

Associate Professors: C. J. Eaves (Medical Genetics), T. A. Grigliatti (Zoology), F. B. Holl (Plant Science), R. Peterson (Animal Science), C. F. Wehrhahn (Animal Resource Ecology).

Assistant Professors: W. R. McMaster (Medical Genetics), G. B. Spiegelman (Microbiology).

Faculty Members of the Genetics Program

Professors: D. A. Applegarth (Medical Genetics), E. P. M. Candido (Biochemistry), K. Cole (Botany), B. R. Green (Botany), J. Hodges (Animal Science), D. G. Holm (Zoology), D. G. Kilburn (Microbiology), J. Levy (Microbiology), R. C. Miller (Microbiology), C. O. Person (Botany), M. Smith (Biochemistry), H. F. Stich (Medical Genetics), D. T. Suzuki (Zoology), G. M. Tener (Biochemistry), R. A. J. Warran (Microbiology), C. J. Walters (Zoology), G. Weeks (Microbiology).

Associate Professors: C. A. Astell (Biochemistry), J. D. Berger (Zoology), F. J. Dill (Medical Genetics), F. R. Ganders (Botany), R. E. W. Hancock (Microbiology), J. H. Myers (Plant Science), H. S. Teh (Microbiology), R. H. Ward (Medical Genetics), J. Worrall (Forest Sciences).

Assistant Professors: J. T. Beatty (Microbiology), H. W. Brock (Zoology), K. M. Cheng (Poultry Science), M. J. Harris (Medical Genetics), R. K. Humphries (Medical Genetics), D. M. Juriloff (Medical Genetics), D. K. Kalousek (Medical Genetics), R. T. A. MacGillivray (Biochemistry), J. McPherson (Botany), A. M. Rose (Medical Genetics), R. San (Medical Genetics), S. Wood (Medical Genetics).

Although there is no Department of Genetics at U.B.C., studies leading to the M.Sc. and Ph.D. degrees in Genetics are available. The Genetics Program is administered by the Advisory Committee on Genetics which is responsible to the Dean of the Faculty of Graduate Studies.

The Genetics Program is flexible, intended to accommodate the diverse background of students wishing to enter it, and also to take account of the broad nature of genetic research. Students who apply for entrance must satisfy the general regulations of the Faculty of Graduate Studies, and must be acceptable to the Genetics Admissions Committee and the Department in which they will work.

The student's graduate program will be decided upon by the student, the adviser, and the student's committee. The formal requirements in this regard, other than those set forth by the Faculty, are as follows. At some time during his or her academic program the student must take a course in each of introductory genetics, biochemistry, and statistics. If these have not been met satisfactorily in the student's undergraduate program, they must be included in the graduate program. In addition, all students will be required to take Genetics 501 and 502 in their first year, and a graduate seminar course of 3 units (usually Medical Genetics 530 or Biology 508). Each student proceeding towards a Ph.D. degree must pass an oral comprehensive examination within six months of passing Genetics 502.

A student's committee for the M.Sc. degree will consist of a minimum of three members including one member of the Advisory Committee, and the student's committee for a Ph.D. degree will consist of a minimum of four members including one member of the Advisory Committee. The Advisory Committee will monitor the progress of all students in the Genetics program.

Additional information on the graduate program in Genetics can be obtained directly from the Chairman of the Advisory committee, or from the Dean of Graduate Studies.

The following undergraduate and graduate courses are offered in the field of Genetics:

Animal Science 413.	Animal Breeding
Animal Science 513.	Quantitative Genetics
Biochemistry 510.	Nucleic Acids — Structure and Function
Biology 334.	Fundamental Genetics
Biology 335.	Principles of Genetics
Biology 434.	Population Genetics
Biology 436.	Fundamentals of Cytogenetics
Biology 508.	Current topics in Genetics
Botany 437.	Plant Genetics
Forestry 302.	Forest Genetics
Forestry 502.	Studies in Forest Genetics
Genetics 501.	Graduate Survey of Genetic Research
Genetics 502.	Graduate Survey of Genetic Research
Genetics 549.	Masters Thesis
Genetics 649.	Ph.D. Thesis
Medical Genetics 410.	Immunogenetics
Medical Genetics 419.	Human Cytogenetics
Medical Genetics 420.	Human Biochemical Genetics
Medical Genetics 421.	Oncogenetics
Medical Genetics 430.	Human Genetics
Medical Genetics 434.	Population Genetics
Medical Genetics 440.	Medical Genetics
Medical Genetics 530.	Advanced Human Genetics
Medical Genetics 548.	Directed Studies
Microbiology 325.	Introductory Bacterial Genetics
Microbiology 408.	Animal Viruses
Microbiology 409.	Bacterial Viruses
Microbiology 503.	Bacterial Cytology and Genetics
Plant Science 413.	Plant Breeding
Plant Science 513.	Topics in Plant Genetics Breeding
Poultry Science 413.	Advanced Genetics in Agriculture
Poultry Science 513.	Quantitative Genetics
Zoology 402.	Evolution
Zoology 325.	Laboratory in Eukaryotic Genetics
Zoology 407.	Selected Topics in Eukaryotic Cell Differentiation and Morphogenesis
Zoology 417.	Advanced Laboratory in Eukaryotic Genetics
Zoology 425.	Advanced Problems in Genetics
Zoology 509.	Population Genetics
Zoology 510.	Development Genetics

GEOGRAPHY—Ph.D., M.A. and M.Sc. degrees

Professor and Head: H. Olav Slaymaker.

Professors: J. D. Chapman, W. G. Hardwick, R. C. Harris, J. E. Hay, D. F. Ley, T. G. McGee, T. R. Oke, A. H. Siemens, J. K. Stager.

Associate Professors: M. Church, R. N. North, G. C. Wynn.

Assistant Professors: T. J. Barnes, M. J. Bovis, K. Denike, D. G. Steyn.

Instructors: R. Copley, M. E. A. North.

The Department offers M.A., M.Sc. and Ph.D. degrees as follows:

(A) Physical Geography, Emphasizing Climatological and Geomorphological Processes
1. Climatology: heat and water balances of active surfaces; energy balances at the micro, synoptic and macro scales; urban climatology; atmospheric diffusion processes.
2. Hydrology: surface water, snow and land use hydrology; sediment yield and quality; energy and mass balance studies in the Coast Mountains and Lower Fraser Valley of B.C.
3. Geomorphology: physical processes in alpine, sub-alpine, and arctic areas; permafrost; Cordilleran river, slope and watershed geomorphology; field experiments; fluvial diffusion processes.

(B) Human Geography, Emphasizing Four Research Clusters
1. Economic: location and regional analysis; spatial organization and interac-

tion including network studies; intra-urban geography, emphasizing policy studies; regional structure and inequality; resource use and allocation; the geography of development in the Third World.

2. Urban: social and behavioural studies of socio-cultural groups, housing and neighbourhoods; the historical study of urban settlements; the changing features of private and public institutions; Third World urbanization.
3. Cultural and Historical: historical studies with a humanistic focus on society and land in the light of changing values, perception and technology; ecological adaptations of land-based cultures including past and present human ecology in Middle American lowlands.
4. Regional: Focussing upon the following regions: — Canada (especially western Canada and the Arctic); Asia (especially China and Southeast Asia); the Soviet Union and Eastern Europe; and Latin America.

The Department participates actively in several interdisciplinary programs: Arctic and Alpine, Hydrology, Resource Science, Urban and Transportation, Asian and Slavonic Studies, Westwater Research Centre, International Relations. Field studies include ongoing projects in the W. Arctic and Cordilleran regions of Canada and special projects in Latin America and Asia.

A brochure is available on application to the Department describing its programs for the Ph.D., M.A., and M.Sc. degrees.

GEOLOGICAL ENGINEERING—Ph.D., M.A.Sc. and M.Eng. degrees

Acting Director: Colin I. Godwin.

Opportunities for graduate work in geological engineering are available at U.B.C., in the Geological Engineering Program. Most programs are based in the Department of Geological Sciences, but they may also be based in the Departments of Civil Engineering, Mining and Mineral Process Engineering or Geophysics and Astronomy. Entrance to a program leading to a graduate engineering degree in the earth sciences is open only to students with an undergraduate degree in geological, geophysical, civil or mineral engineering.

Students who wish to pursue geological engineering studies in the fields of mineralogy, petrology, geochemistry, sedimentology or stratigraphy, or in economic, marine, surficial, structural, or environmental geology should apply to the Department of Geological Sciences for admission into their graduate program.

Students who wish to pursue geotechnical studies should apply to the Department of Geological Sciences if their primary field of interest is engineering geology including slope stability or groundwater hydrology. They should apply to the Department of Mineral Engineering if their primary field of interest is applied rock mechanics or the geotechnical aspects of mine design. They should apply to the Department of Civil Engineering if their primary interest is in soil mechanics or water resources; or to the Department of Geophysics and Astronomy if their interest is in engineering geophysics.

Prospective applicants should also consult the descriptions of graduate study in the pertinent departments. Lists of faculty members are included there. Students accepted in any of these departments must satisfy the usual graduate requirements of the department in which they are registered. Inter-disciplinary programs that involve courses from two or more of the associated departments (and from other departments) are encouraged and supported. The Board of Study for Geological Engineering (as described under the Faculty of Applied Science) will act in an advisory capacity for students involved in interdisciplinary studies.

GEOLOGICAL SCIENCES—Ph.D. and M.Sc. degrees

Professor and Head: A. J. Sinclair.

Professors: Richard Lee Armstrong, R. L. St. L. Chase, W. R. Danner, R. Allan Freeze, H. J. Greenwood, E. P. Meagher, J. W. Murray, J. V. Ross, Glenn E. Rouse.

Associate Professors: W. C. Barnes, R. M. Bustin, W. K. Fletcher, C. I. Godwin, J. L. Smith.

Assistant Professors: T. H. Brown, P. L. Smith.

Instructor: C. A. Giovanella.

The department is housed in a modern Geological Sciences Centre well-equipped for research and study. Major facilities include: x-ray fluorescence and diffraction; laboratories for analytical and organic geochemistry using atomic absorption, colorimetry, flame photometry, wet chemistry, gas-liquid and thin-layer chromatography, and spectrography; rock and mineral preparation equipment; microscope and photographic laboratories; pressure apparatus for experimental petrology and experimental structural studies; electronic and machine shops; an ARL SEMQ electron microprobe-scanning electron microscope with minicomputer control of stage, spectrometers, counting, and data reduction; shields-type mass spectrometer for Rb-Sr which is fully-automated. Terminals for access to the U.B.C. computing centre are provided in the building. A geological K/Ar dating laboratory is provided in co-operation with the Department of Geophysics and Astronomy. Maps, books, and periodicals are available in a large reading room.

Co-operation with the B.C. Ministry of Energy Mines and Petroleum Resources, the Geological Survey, the mining industry, and other Earth Science departments at U.B.C (notably Geophysics and Astronomy, Geography, Oceanography, Botany, Soil Science, Metallurgy, Mining and Mineral Process Engineering and Civil Engineering) enables students to take advantage of facilities, instruction and advice in neighbouring fields.

British Columbia offers exceptional opportunity for combined field and laboratory research. Vancouver, in the tectonic setting of the Pacific margin, is a centre for the Canadian mining industry and for off-shore petroleum exploration. The Cordillera offers research opportunities in the petrology of intrusive and volcanic rocks of many kinds, and of metamorphic rocks of all grades; in structural studies of complex metamorphic terrains exposed in three dimensions; in metalliferous deposits of varied genetic types; in mineral exploration methods; in mineralogy associated with many different environments; in complexly folded and faulted successions of bedded rocks in the mountain belts or plateaux, and in virtually undisturbed coal and gas-bearing strata of the northeastern part of the province. The fjords, fjord lakes, deltas, tidal flats, continental shelf and oceanic depths provide a wide range of aquatic environments for students interested in sedimentology, geochemistry, biostratigraphy, and geological oceanography. In the Vancouver area there are numerous problems of engineering and environmental geology related to water, slope stability, urban development, and natural geologic hazards. Time-sharing computer terminals provide access to one of the largest and most user-oriented computer systems in Canada.

Ph.D. degree

Courses in Geology and related fields will be selected in consultation with the candidate's committee.

M.Sc. degree

Course includes Thesis and nine units of graduate or advanced courses in Geology and related subjects selected in consultation with the Graduate Standing Committee. A non-thesis M.Sc. also is offered.

GEOPHYSICS AND ASTRONOMY—Ph.D., M.Sc. and M.A.Sc. degrees

Professor and Head: T. K. Menon.

Honorary Professor: Anne B. Underhill.

Professors: Jason R. Auman, Garry K. C. Clarke, Ronald M. Clowes, Robert M. Ellis, Gregory G. Fahlman, Michael W. Ovenden, Harvey B. Richer, R. Doncaster Russell, William F. Slawson, Bernard Shizgal, Tadeusz J. Ulrych, Gordon A. H. Walker, Tomiya Watanabe.

Associate Professor: Douglas W. Oldenburg.

Assistant Professors: Paul Hickson, Matthew T. Yedlin.

An outline of the research and facilities available follows:

ASTRONOMY

The department offers opportunities for advanced study and research covering most areas of modern astronomy. Both observational and theoretical studies are supported.

Research programs at optical wavelengths of current interest include photometric studies of stellar populations in the Milky Way and in external galaxies, photometric and spectroscopic studies of distant galaxies and active galactic nuclei, precise radial velocity studies of nearby stars in order to detect planetary companions, time resolved spectroscopy of variable stars and active binary star systems. At radio wavelengths, studies of the thermal and non-thermal radiation from galaxies, quasars and related active extra galactic objects are being pursued.

Much of the observational work at optical wavelengths is supported by a continuing program of instrumentation development. Several low light level electronic detector systems have been constructed and are in use at the Dominion Astrophysical Observatory and the Canada-France-Hawaii Telescope. Advanced instrumentation development is supported by Astronomical electronics laboratories, a departmental machine shop and the use of the U.B.C. 40 cm telescope as a test facility. Current efforts are directed toward the development of large two-dimensional detectors for both wide field photometry and spectroscopy.

In addition to theoretical studies related to the observational programs, research on the structure and dynamics of both hot and cool stellar atmospheres is being actively pursued. Studies related to the dynamics of planetary exospheres, the interplanetary medium and the interstellar medium can also be supported.

The astronomy group operates a computing facility based on a VAX 11/750 CPU, with peripherals which include an array processor and an image processing system. Major software packages are available for the analysis of one and two-dimensional spectroscopic data, wide field photometric data of stellar fields and extended objects, and for radio data obtained at the Very Large Array. The facilities of the campus computing center, which includes an Amdahl 580 and extensive peripherals and software support is also available.

The 3.6 m Canada-France-Hawaii Telescope is regularly used for departmental research programs. Time is also readily available on the 1.2 m and 1.8 m telescopes

of the Dominion Astrophysical Observatory for approved research programs. The use of these and other facilities, including satellite ground stations, in graduate research programs is fully supported by faculty members.

GEOPHYSICS

(a) Geophysical Analysis

Two approaches are being pursued to analyse geophysical data sets. The first is by means of time series modelling. In this method the data are regarded as the output of a filter whose form is dependent upon the physics of the problem; examples include autoregressive and mixed autoregressive-moving average models. The use of such filters leads naturally to maximum-entropy spectral analysis, predictive deconvolution and optimal signal enhancement and these techniques are being applied to time series of geophysical and astronomical interest. The second approach uses mathematical techniques to invert geophysical measurements. The dominant interest here is in the electric and electromagnetic observations required to determine the electrical conductivity of the earth's crust and upper mantle, but other data sets, including those from seismology and geochronology, are being actively investigated.

(b) Glaciology

Glaciological research ranges from field studies and instrumentation development to theory and computer modelling. Flow instabilities of glaciers and ice sheets are one major area of interest. In this connection we are undertaking a long term field study of Trapridge Glacier in the St. Elias Mountains, Yukon Territory. Closely related to this research are our studies of outburst floods from ice-dammed lakes. Such lakes are occasionally formed by glacier advances and pose an unusual environmental hazard to development in northwestern Canada.

We have an 840 MHz pulsed radar system, designed and built at UBC, that takes airborne measurements of glacier ice thickness. In recent years we have completed airborne surveys of glaciers in Alaska, the Yukon Territory and glaciers and ice shelves in northern Ellesmere Island, Arctic Canada.

Avalanche research is now being undertaken in collaboration with the National Research Council of Canada. Current interest is centered on applied research in snow mechanics, avalanche dynamics and avalanche forecasting.

Theoretical investigations of glacier flow and glacier surging as well as "UHF pulsed-radar" experiments are being undertaken. Field measurements are made on the Rusty, Trapridge and Steele Glaciers in the Yukon Territory. Oxygen-18/Oxygen-16 investigations of ice and snow are included in our projects.

(c) Geomagnetism and Aeronomy.

The main emphasis has been on a study of ultra-low frequency variations of the Earth's magnetic field. This has been extended to fundamental problems of the solar-terrestrial physics. Data on magnetic pulsations, aurora displays, and VLF radio emissions have been collected in central Canada and the U.S. in the latitude range 40° to 70°. The collected data are being analyzed with the objective of gaining an improved understanding of generation mechanisms. A project is underway to examine effects of geomagnetic variations upon power transmission systems. Precisely how these variations give rise to effects which interrupt the power systems is not understood.

(d) Instrumentation

Theoretical and experimental studies are made of electronic, electro-mechanical and geomagnetic devices for geophysical measurement. Noise studies and fundamental physical limitations are of special interest. Experimental work on semiconductor devices to measure electrostatic fields and on the mechanoelectric (piezoelectric) prospecting methods is being undertaken. Applications of mini-computers and microprocessors are involved.

(e) Isotopic Studies and Mass Spectrometry

There is a strong research interest in the interpretation of radiogenic isotopes, with emphasis on the early history of the earth. These include interpretations of the abundances of cosmogenic nuclides. Geophysical inversion techniques are used for these studies. The Department operates an oxygen isotope facility which is used primarily for hydrological studies. There exist three mass spectrometers in the Department of Geological Sciences to which the Department can arrange access.

(f) Seismology and Tectonophysics

Programs in experimental seismology are focussed on the development of models to understand both past and current tectonic processes in the western Canadian Cordillera, the adjacent sedimentary basins and active oceanic region. Combined marine-land studies using both explosion and earthquake data are underway to determine structure of the lithosphere and to understand the nature of plate boundaries. In this respect, the Queen Charlotte transform fault, separating the Pacific and America plates, and the surrounding regions is an area of intensive study. A newly established project is a detailed investigation of the Juan de Fuca ridge and the possible existence of a magma chamber at this spreading centre between the Pacific and Juan de Fuca plates. Through collaborative projects with other academic and governmental groups, multichannel crustal reflection studies have become an active area of research. To date these programs have studied the accretionary tectonics of Vancouver Island and offshore and the subduction zone interaction of the small Juan de Fuca plate with the large America plate. Interpretation methods include synthetic seismogram calculations, ray tracing through inhomogenous media, traveltime inversions, special time series techniques and focal mechanism studies. Relation of seismic results to geology and tectonics is emphasized. Instrumentation includes 12 digital cassette recording seismographs, a 6-element telemetered array, 5 portable FM seismographs, a dual channel radio telemetering sonobuoy system, a 32 litre airgun, 6 ocean bottom seismographs, and a PDP 11/34 computer system for A/D conversion, editing and plotting.

In theoretical studies, frequency domain techniques involving Fresnel integrals have been used to calculate synthetic seismograms for simple geometries. Further modifications of one dimensional synthetic seismogram computations for inhomogeneous media are being developed using the method of modulated simple waves. This method will be applied to the analysis of well-log data.

(g) Applied Geophysics

Gravity, magnetotelluric, seismic and induced polarization field studies are incorporated with instrumentation and communication theory. The direct inversion of different geophysical data sets is being actively pursued. A new finite difference method is being developed for solving Poisson's equation in two and three dimensions in unbounded domains. The resultant code will have applications in gravity and magnetic modelling.

Ph.D., M.Sc., and M.A.Sc. Degrees

Candidates are expected to have the equivalent of an Honours Degree in Science or Engineering, with a firm background of mathematics and physics up to fourth-year level. While some undergraduate instruction in geophysics, geology or astronomy (as appropriate) is an advantage, it is not a prerequisite for entry into graduate programs of the Department. Geophysics students who have not completed a course in physics of the earth at either the senior undergraduate or graduate level will be required to register for Geophysics 426 and those with no formal training in geology will be required to take Geophysics 502. Students enrolled for a degree in Astronomy with no formal training in astronomy will be required to take Astronomy 500.

The 6-unit M.Sc. thesis is normal in the Department. For the M.Sc. in Geophysics one of Physics 502 or Mathematics 500 is required. The M.Sc. in Astronomy must include at least 2 units from outside the Department chosen from Mathematics 500, Physics 501, 502, 505 and 507.

A leaflet giving further details of the degree programs and the availability of financial support for students is available from the Department.

Complete course descriptions are in the "Courses of Instruction" section of this calendar.

GERMANIC STUDIES—Ph.D. and M.A. degrees

Professor and Head: Klaus Petersen.

Professors: Michael S. Batts, Mark Boulby, Marketa Goetz-Stankiewicz, Patrick O'Neill.

Associate Professors: Leslie L. Miller, Edward Mornin, Peter A. Stenberg.

Assistant Professors: Horst Martin, Karl Zaenker, Ronald Beaumont.

The Department of Germanic Studies offers courses leading to the degree of M.A. (with or without thesis) and Ph.D. The courses and seminars are normally given either every year or every second year. For details concerning these courses and for information on specific requirements for graduate degrees, application should be made to the Graduate Adviser of the Department of Germanic Studies.

The resources of the University library are adequate for research in all fields of German literature and are particularly strong in the mediaeval and the nineteenth and twentieth century areas. Funds are available for the acquisition of materials in areas in which graduate students develop specific interest. To complement library resources, the Department maintains a reading room for graduate students, in which reference works, editions of standard authors, and some periodicals are kept.

GERONTOLOGY COMMITTEE

Co-ordinator: J. E. Thornton (Administrative, Adult, and Higher Education)

Faculty members in a number of disciplines and professions on campus have a particular interest in the study of aging and the aged. Gerontological concerns are diverse and multifaceted. Basic and applied age-related research is also conducted in several departments and professional schools. Educational offerings in Gerontology have evolved out of the work of Committees on Gerontology established at U.B.C. in 1974.

Although U.B.C. does not offer a Graduate Degree in Gerontology per se, the Committee on Gerontology within Graduate Studies performs an advisory function enabling students to develop a program of studies with substantial gerontological content. The following Schools, Departments and Faculties may provide educational opportunities at the graduate level which focus on Gerontology: Anthropology-Sociology, Architecture, Community and Regional Planning, Economics, Education, Family and Nutritional Sciences, Family Practice, Geriatric Medicine, Health Care and Epidemiology, Law, Librarianship, Nursing, Pharmaceutical Sci-

ences, Psychology, Physical Education and Recreation, Rehabilitation Medicine, Social Work, Sociology.

Students will be expected to satisfy the general entrance regulations of the Faculty of Graduate Studies and specific requirements of the appropriate department. Advice about courses in Gerontology can be provided by Dr. J. E. Thornton, Coordinator of the Committee on Gerontology.

GREEK—M.A. and Ph.D. degrees (see Classics)

Normally, the Ph.D. thesis will be written on a Greek subject and the degree will be taken in Classics.

HEALTH CARE AND EPIDEMIOLOGY—M.Sc. and M.H.Sc. degrees.

Professor and Head: T. W. Anderson.

Professors: J. H. Milsum, G. Szasz.

Associate Professors: F. P. Glick, R. E. Modrow, B. J. Morrison, N. E. Morrison, A. Stark.

Assistant Professors: M. Barer, C. Hertzman, R. G. Mathias, M. Schechter, S. Sheps, C. van Netten.

M.Sc. (Health Services Planning and Administration)

An M.Sc. program is offered that is specifically designed to provide the educational basis for individuals desiring to pursue careers in health services planning and administration. Program requirements can be accomplished in two years of full-time attendance. Preference is given to those individuals who, in addition to meeting Faculty of Graduate Studies requirements, have had at least four years of relevant post-first degree working experience. The program requires 28.5 units of study with elective coursework available within the Department as well as in other Departments and Faculties. Prerequisites include coursework in economics and management. Required course-work includes COMM 323; 529; 336 and either 457 or 458; ECON 384.

This program is accredited by the Accrediting Commission on Education for Health Services Administration.

Application deadline is April 30. A detailed brochure is available on application to the Department.

M.H.Sc.

The Master of Health Science (M.H.Sc.) Program is designed to provide graduate education for physicians in the areas of Clinical Epidemiology, Occupational Health or Community Health. Minimum admission requirements for this 15 unit program include an academic record that meets Faculty of Graduate Studies requirements, an M.D. or equivalent medical degree, and one year of clinical experience.

All application materials must be received by April 30.

HISPANIC AND ITALIAN STUDIES—Ph.D. and M.A. degrees

Associate Professor and Head: D. C. Carr (Spanish).

Professors: D. Aguzzi-Barbagli (Italian), A. Pacheco (Spanish).

Associate Professors: J. Bryans (Spanish), M. Chiarenza (Italian), S. Ciccone (Italian), G. De Stefanis (Italian), R. M. Flores (Spanish), K. I. Kobbervig (Spanish), I. Rubio (Spanish), M. Tomsich (Spanish), A. Urrello (Spanish).

Assistant Professors: C. Chiarenza (Italian), M. G. R. Coope (Spanish).

The Department offers graduate programs leading to the M.A. degree with or without thesis, and to the Ph.D. The M.A. degree may be taken in Italian Literature, or in Spanish Language, Spanish Peninsular Literature or Spanish-American Literature. The Ph.D. is offered in Spanish Peninsular and Spanish-American Literature.

The University Library has extensive holdings in Italian and in all Hispanic areas, especially in periodicals and Latin-American Studies, both Spanish and Portuguese. There is also a Departmental Reading room for Graduate Students, containing basic texts, scholarly collections and reference works.

A detailed brochure describing the graduate programs is available on application to the Graduate Adviser of the Department of Hispanic and Italian Studies.

HISTORY—Ph.D. and M.A. degrees

Professor and Head: Richard W. Unger.

Professors: Ivan Avakumovic, Janos M. Bak, David Breen, John S. Conway, Peter Harnetty, L. E. Hill, Robert V. Kubicek, Harvey Mitchell, John M. Norris, Arthur J. Ray, Allen A. Sinel, Edgar Wickberg, James H. Winter, Alexander Woodside.

Associate Professors: Roderick Barman, George W. Egerton, A. Jean Elder, C. Friedrichs, F. Murray Greenwood, Charles W. Humphries, E. J. Hundert, Daniel M. Klang, Fritz Lehmann, A. N. MacDonald, Peter N. Moogk, Allan C. L. Smith, Christopher W. Stocker, Murray M. Tolmie, W. Alan Tully, W. Peter Ward, William Wray.

Assistant Professors: June I. Gow, James P. Huzel, Catherine C. Le Grand, Robert McDonald, Dianne Newell, H. Keith Ralston, Stephen M. Straker.

The Department offers M.A. and Ph.D. programs, both requiring a thesis, in the fields of Canadian, Asian, European (medieval, early modern and modern), British, British Imperial and Commonwealth, American and Latin American History. Within these areas the Faculty offers graduate reading courses and research seminars in the main varieties of political, diplomatic, economic, social and intellectual history, including history of science and medicine. Research in all these fields is facilitated by the largest library holdings on microform in Canada, including government publications, state papers, newspapers and very extensive collections of early modern pamphlets and literature. There are notable collections of books in the history of the American West, of Canada (one of the best in Canada, with especially large sections on British Columbia and the Prairie West), international relations, France (particularly the 18th century and pre-Revolutionary through Napoleon), Germany (the best in Canada, outstanding on Württemberg), Eastern Europe, radical movements in Europe and North America, medicine and science (The Woodward Library), and East Asian (especially Japanese business history). A detailed brochure describing the Department's programs for the Ph.D. and M.A. degrees is available upon application.

HUMAN NUTRITION (School of Family and Nutritional Sciences)—Ph.D. and M.Sc. degrees.

Professor and Director: Roy H. Rodgers.

Professors: I. D. Desai, Melvin Lee, J. Leichter.

Associate Professor: Nancy E. Schwartz.

Assistant Professors: Susan I. Barr.

Instructor: C. Daem.

Lecturer from another Department: Peter Hahn, Prof. Obstetrics and Gynecology.

The Division of Human Nutrition of the School of Family and Nutritional Sciences offers opportunities for advanced study and original investigations in basic and applied human nutrition, in selected aspects of clinical and community nutrition, and in nutrition education. The curriculum includes course work and thesis research through laboratory or field work.

Excellent research and teaching laboratories are located in a building completed in 1982. These include modern instruments for automated biochemical analyses, radioisotope tracer studies, atomic absorption spectrophotometry, computerized behavior monitoring, and other routine laboratory procedures relevant to nutritional investigation. Facilities for small animals (rats, mice, etc.) are available. There are excellent computer facilities.

Opportunities are offered at both the Master's and Doctoral level for research in topics such as: 1) Nutrition and physical activity; 2) Vitamin E and A status in man; 3) Food habits and nutritional status of migrants in Brazil; 4) Nutritional insults during gestation and behavioral development and growth of the young; 5) Pre- and postnatal mammalian development of lipid and carbohydrate metabolism; 6) Carnitine metabolism; 7) Indigenous foods and nutritional status of native people; 8) Maternal nutrition and fetal development; 9) Trace mineral metabolism; 10) Alcohol and nutrient bioavailability; 11) Fetal alcohol syndrome; 12) Nutrition education; 13) Evaluation of nutritional care, and other topics of interest to students and faculty members.

M.Sc. Program

For admission with full standing the candidate must hold a Bachelor's degree in Biological or Chemical Sciences, Home Economics (preferably with a major in Foods, Nutrition or Dietetics), Agriculture Sciences, Health Sciences or a related field, with First Class (80% or above) standing in at least two courses (6 units) relevant to Human Nutrition, and at least Second Class (65 to 79%) standing in the remaining third and fourth year courses relevant to Human Nutrition. Students entering the graduate program in Human Nutrition are expected to have on their record recent courses in biochemistry with laboratory, physiology, and advanced nutrition. Students deficient in one of these areas will be required to take the appropriate courses early in the graduate program. Applicants deficient in more than one area will have to complete a qualifying year as unclassified students before they can be considered for admission to the graduate program.

Ph.D. Program

Applicants will be expected to a) hold a Master's degree in nutrition or in a closely related discipline or b) have completed the first year of the M.Sc. program in Human Nutrition at UBC with nine units of First Class Average, of which at least five units must be at the 500 level or above and at least five units must be of First Class standing, or c) have a Bachelor's degree with First Class Honours in Nutrition, or a closely related discipline. Applicants lacking some relevant undergraduate courses may be required to complete those courses early in the program or in a qualifying year prior to admission into the Ph.D. program.

Courses in Human Nutrition are listed in the course offerings of the School of Family and Nutritional Sciences.

CENTRE FOR HUMAN SETTLEMENTS

Professor and Director: H. Peter Oberlander (Community and Regional Planning).

Administrator: Knute Buttedahl (Adult Education).

At the time of the United Nations Conference on Human Settlements held in Vancouver in May 1976, the Centre was created to provide a research focus and continuing support for scholarship in the field of Human Settlements. It is administered by a director responsible to an interdisciplinary Board of Management chaired by the Dean of the Faculty of Graduate Studies.

The Centre is currently providing four programs:

1. A scholar-in-residence program brings to the campus distinguished academics and professionals for varying lengths of time to conduct research on human settlement issues, and offer campus-wide lectures under the Habitat Lecture Series.
2. Invitational seminars are being convened to discuss and review urgent human settlement issues with specific reference to B.C., Canada and U.N. agency programs and to recommend action within a local, national or international framework.
3. The Scholar-in-Residence program and Invitational Seminars provide new knowledge and insights that are being published through research monographs and Occasional Papers. More than 50 items have been published, including seven books produced jointly with the UBC Press. A catalogue of titles is available upon request.
4. Access to the audio-visual reference library of video-tapes of the 240 presentations contributed by the 140 nations to the U.N. Conference on Human Settlements, Habitat 1976. This collection, administered by the University Library, represents a wide range of audio-visual documentation on problems and solutions to human settlements across the world. This initial collection has now been expanded by the addition of about 500 video-tapes.

All the above programs are being conducted with the active support of the relevant departments on the campus. Each program is designed to bring together faculty, students and professionals around topics of common interest and encourage a growing research activity in the field of human settlements, financed by Federal, Provincial and private agencies.

HYDROLOGY

Opportunities are available for graduate work in hydrology on a variety of programs. Individual courses pertaining to hydrology are available in the Departments of Bio-Resource Engineering, Civil Engineering, Geography, Geological Science, Oceanography, Soil Science, and the Faculty of Forestry. Supervision of advanced work in various aspects of hydrology can be undertaken within these disciplines.

Students seeking admission to the interdisciplinary Ph.D. program in hydrology should apply directly to the Dean of Graduate Studies. A committee of faculty members knowledgeable in areas of particular interest to the applicant and representing at least three different disciplines will be convened by the Coordinator of the Interdisciplinary Hydrology Program. Criteria to be used when considering an applicant for the interdisciplinary program will include the appropriateness of undergraduate course background.

The following is a suggested guide:-

(1) Mathematics, up to and including Differential Equations (e.g., U.B.C., equivalent is Mathematics 315)
(2) Inferential Statistics, (e.g., Statistics 205)
(3) Physics of fluid flow, (e.g., Civil Engineering 215/216)
(4) Introduction to Meteorology and Climatology (e.g., Geography 301, 302, 409, Physics 421 or Soil Science 414)
(5) Introduction to Surface Water Hydrology (e.g., Civil Engineering 478, Forestry 385 or Geography 205)
(6) Introduction to Subsurface Hydrology (e.g., Geology 342 or Soil Science 413)

At least 3 units from the following list of graduate courses are required as part of the Ph.D. program.

Bio-Resource Engineering	560, 561, 562
Civil Engineering	546, 551, 554, 556
Forestry	585, 587
Geography	522, 525, 526, 560, 561
Geology	562, 564, 565, 566
Oceanography	518, 526
Soil Science	501, 513, 514, 524, 533

INSTITUTE OF INDUSTRIAL RELATIONS

All activities of the Institute were suspended indefinitely in 1977. Graduate study in various aspects of Industrial Relations may be undertaken in the Departments of Anthropology and Sociology, Economics, History, and Psychology in the Faculty of Arts, and the Faculties of Commerce and Law. The Faculty of Commerce offers a Master of Science degree with a specialization in Industrial Relations and has an Industrial Relations Committee to co-ordinate activities within that Faculty. Prospective students should contact any of the departments or faculties listed above for further information on programs of study.

INSTITUTE OF INTERNATIONAL RELATIONS

Director: Dr. M. W. Zacher (Political Science).

The Institute of International Relations was established in 1970 to promote and organize multi-disciplinary research projects on international relations. Included within the scope of the Institute is research on international politics and organization, diplomatic history, strategic studies, international legal problems, trade and development, and social science theory insofar as it helps describe or explain international relationships. The Institute endeavours to support individual or group research projects at the graduate, post-doctoral, and faculty levels through grants, graduate and postdoctoral fellowships, professional conferences, publication subsidies, and other services. The Institute itself does not offer courses or degree programs. Membership or association with the Institute is open to graduate students and academic staff from all departments and faculties.

The major research project within the Institute is at present on international regulatory problems. It is also sponsoring work on international oceans problems and strategic studies.

Information regarding the programs of the Institute may be obtained from the Director.

INTERDISCIPLINARY STUDIES

The Faculty of Graduate Studies encourages the realignment of traditional disciplines into new patterns, crossing departmental and faculty boundaries where this will foster the development of new areas of learning. A major function of the various institutes of the Faculty consists in promoting interdisciplinary research.

Degree programs are also available in interdisciplinary studies. In some cases, an interdisciplinary area has been authorized to offer and administer formal degree programs (e.g., Genetics, Comparative Literature, etc.). Where no established degree program exists, a student may request admission into a special individual interdisciplinary program administered by an *ad hoc* committee representing the various disciplines involved. All arrangements involving special interdisciplinary programs must be approved by the Dean. The Dean will review annually the progress of all students in special interdisciplinary programs.

Some inter-departmental or inter-faculty groupings offer guidance to students in setting up individual interdisciplinary programs. See Calendar entries listed under Institutes, Centres, Committees.

Enquiries should be directed to the office of the Dean, Faculty of Graduate Studies.

ITALIAN—(see Hispanic and Italian Studies)

LATIN—M.A. and Ph.D. degrees (see Classics)

Normally, the Ph.D. thesis will be written on a Latin subject and the degree will be taken in Classics.

LAW—LL.M. degree

Professor and Dean: P. T. Burns.

Professors: J. J. Atrens, J. Blom, C. B. Bourne, G. F. Curtis (Dean Emeritus), M. A. Hickling, J. Hogarth, M. A. Jackson, D. J. MacDougall, J. M. MacIntyre, A. J. McClean, D. M. McRae, D. J. Pavlich, D. E. Sanders, A. F. Sheppard, J. C. Smith, M. D. H. Smith, J. P. Taylor, A. R. Thompson, E. C. E. Todd.

Associate Professors: W. W. Black, R. M. Elliott, K. B. Farquhar, R. T. Franson, G. B. Klippert, M. T. MacCrimmon, R. K. Paterson, R. S. Reid, B. Slutsky, C. L. Smith, J. M. P. Weiler, S. M. Wexler.

Assistant Professors: D. Cohen, D. A. Dadson, R. D. Diebolt, E. T. Edinger, J. Horn, H. L. Kushner.

Purpose

The program provides graduates with the opportunity for advanced legal education in preparation for law teaching, legal research, public service and the practice of law. It does not give entry to the British Columbia or other bar.

A candidate for admission to the graduate program:

(a) must demonstrate a capability to engage in creditable research in Law
(b) must have a Bachelor of Laws degree or its equivalent from an approved law school, and
(c) have obtained First Class standing or its equivalent in at least two of the courses and at least Second Class standing or its equivalent in the remaining courses of the final year of work that is accepted by the Faculty of Law as prerequisite to the Master's program.

Areas of Study

The program for each candidate will be designed to meet his or her special needs, interests, and previous experience. Special courses may be arranged to cover various areas of the law in which the Faculty of Law has special library or other facilities. Students may write their theses, under the supervision of members of the

Faculty, in the specific fields of law in the undergraduate curriculum or in such additional fields of study as may be arranged with the Faculty.
See also LL.B./M.B.A. Combined Program.

LINGUISTICS—Ph.D. and M.A. degrees

Professor and Acting Head: David Ingram.

Professors: M. Dale Kinkade, Bernard Saint-Jacques.

Associate Professor: Guy Carden.

Assistant Professors: Michael Rochemont, Patricia Shaw.

Instructor: Ingrida Brenzinger.

Lecturers from other Departments: Andre-Pierre Benguerel (Audiology and Speech Sciences), J. H. V. Gilbert (Audiology and Speech Sciences), Frank R. Hamlin (French), Karl I. Kobbervig (Hispanic and Italian Studies), Matsuo Soga (Asian Studies).

The Department offers opportunities for advanced study in Linguistics leading to the degrees of M.A. and Ph.D.

The M.A. in Linguistics may be taken with or without a thesis in accordance with the general regulations.

The areas of research in which students may be accepted for the Ph.D. include linguistic theory, language acquisition, American Indian linguistics, historical and comparative linguistics, Japanese linguistics, psycholinguistics, sociolinguistics, bilingualism, and linguistic theories of translation and second-language acquisition.

Course work for all graduate students is planned on the basis of individual requirements and research projects. Appropriate interdisciplinary programs may be arranged.

More detailed information may be obtained from the Department.

Combined LL.B./M.B.A. Program

(Implementation of this program is subject to final approval by the Universities Council of B.C.)

The Faculty of Law and the Faculty of Commerce and Business Administration offer a combined program leading to the degrees of Bachelor of Laws (LL.B.) and Master of Business Administration (M.B.A.).

The Combined Program is designed to provide students with the fundamentals of both legal education with a specialization in commercial law subjects and business education. The program emphasizes the legal aspects of business and the business aspects of law. Graduates will be eligible to qualify for the practice of law or to pursue a career in management.

The program is administered by a Joint Degrees Committee, consisting of equal representation from the Faculties of Law, and Commerce and Business Administration. The Joint Degrees Committee is also responsible for advising and supervising students in the program.

Admission

Applicants must satisfy the admission requirements of both the Faculty of Law and the Faculty of Graduate Studies. Students seeking admission to the Combined Program must apply separately to each Faculty and to the Combined Program in accordance with the usual procedure as set out elsewhere in this Calendar.

The number of students to be admitted to the Combined Program is limited and will be determined annually by the Joint Degrees Committee and the Faculties involved, according to the principles approved by the Senate. Students who have successfully completed first year Law or first year in the M.B.A. program before the implementation of the Combined Program may be admitted to the Program with the permission of the Joint Degrees Committee.

Two classes of students are not eligible for admission to the Combined Program:

(a) Students who do not at the time of application have a university undergraduate degree.
(b) Students in the combined program leading the the degrees of LL.B. and B.Com.

A candidate who does not meet the requirements for admission to the Combined Program may apply separately to either the Faculty of Law or the Faculty of Commerce and Business Administration.

Requirements of the Combined Program

Except as stated below the ordinary requirements of the degrees of LL.B. and M.B.A. apply to students in the Combined Program.

Students in the Combined Program are required to take 43 units of courses in Law and 28 units of courses of the M.B.A. program in four Winter Sessons and one Spring or Summer Session, as follows:

	Units
Year 1: First Year Law	16.0
Year 2: First Year M.B.A.	16.0
Year 3: 13.5 units in Law and 3 units of 500 level Commerce	16.5
Year 4: 13.5 units in Law and Commerce 591-592 (3 units)	16.5
Spring or Summer Session (between Years 2 and 3, and between Years 3 and 4 or after Year 4):	
6 units of 500 level Commerce	6.0
Total	71.0

Requirements During Years 3 and 4, and Spring or Summer Session

Commerce Requirements

Students will be required to take twelve units of 500-level courses in Commerce including Commerce 591-592 (3 units) to be selected in accordance with the normal rules applying to the M.B.A. program, but subject in all cases to the final approval of the Joint Degrees Committee. These units of senior Law courses will count as credit toward the M.B.A. degree. In addition students are required to complete a (non-credit) major essay and to write a comprehensive examination as part of the M.B.A. program.

Law Requirements

A total of 27 units of Law courses must be taken in Years 3 and 4 as follows:

	Units
(a) **Required Courses**	
All Students must take:	
Law 300, Moot Court	1
Law 379, Evidence	2
Law 325, Business Associations I	2
Students who have not previously obtained credit for Commerce 355, Income Taxation, are required to take Law 330, Taxation I. Students who have previously obtained credit for Commerce 355, may not take Law 330, but are required to take in substitution a Law course of equivalent unit value. Commerce 355 will be deemed equivalent to Law 330 for prerequisite purposes	1.5
(b) **Restricted Electives**	
A minimum of 10 units of senior courses in Law must be chosen from a set of Law courses in the corporate, commercial, or taxation area as determined from year to year by the Joint Degrees Committee. The choice of electives is subject to the approval of the Joint Degrees Committee.	10 or more
(c) **Free Electives**	
Subject to the prior approval of the Joint Degree Committee, a student may take any senior Law Courses of a combined unit value not exceeding 10.5.	10.5 or less
Total Units	27.0

Restrictions

Students in the Combined Program are not eligible for the Law Faculty non-Law option.

Special Arrangements

Subject to the approval of the Joint Degrees Committee,

(a) The first years of the LL.B. and M.B.A. programs may be interchanged upon petition.
(b) Students who have successfully completed the first year of the M.B.A. may, as an alternative to taking three units of Commerce 500-level courses during the Winter Sessions of Years 3 and 4, taken such courses in Spring or Summer Sessions before Year 4;
(c) Students who receive exemption for courses in the first year of the M.B.A. program will have their unit requirement reduced accordingly. Such exempted courses may be replaced by 300-400 level courses for which no graduate credit will be granted or by 500-level Commerce courses for which graduate course credit will be granted. In the latter case the required units of 500-level Commerce courses subsequent to Year 2 will be reduced accordingly.

Granting of degrees

The LL.B. and M.B.A. degrees will be conferred at the completion of the Combined Program after all requirements for both degrees have been met. Students who choose to receive either the M.B.A. or LL.B. degree prior to completion of the Combined Program may apply for one of the degrees provided all requirements for that degree have been satisfied. Students selecting this option must simultaneously withdraw from the Combined Program.

MATHEMATICS—Ph.D., M.Sc. and M.A. degrees

Professor and Head: M. Sion.

Professors: R. A. Adams, D. W. Boyd, A. T. Bui, P. Bullen, Donald Bures, J. B. Carrell, W. A. Casselman, R. V. Chacon, C. W. Clark, F. H. Clarke, N. J. Divinsky, R. Douglas, J. J. F. Fournier, A. Frei, E. E. Granirer, P. Green-

wood, U. G. Haussmann, J. C. Heywood, K. Hoechsmann, K. Y. Lam, D. Ludwig, E. Luft, Z. A. Melzak, R. M. Miura, L. A. Mysak, R. Ree, R. A. Restrepo, D. P. Rolfsen, L. Rosen, B. R. Seymour, M. Sion, D. K. Sjerve, C. A. Swanson, J. Walsh, R. Westwick, J. V. Whittaker.

Associate Professors: A. Adler, R. F. V. Anderson, L. P. Belluce, G. Bluman, A. H. Cayford, B. Chang, R. R. Christian, J. E. Coury, J. S. Feldman, N. H. Fenichel, N. Ghoussoub, R. Israel, P. J. Kiernan, J. L. MacDonald, G. Maxwell, S. S. Page, E. Perkins, L. G. Roberts, H. A. Thurston, G. K. White.

Assistant Professors: R. Anstee, R. Gupta, C. W. Lamb.

The Department of Mathematics offers programs of study in the various branches of pure and applied mathematics. Students should consult the brochures, available from the Department, containing descriptions of courses and of programs as well as information on financial aid and application forms. Students particularly interested in applied mathematics and/or statistics should also consult the listing under the Institute of Applied Mathematics and the Department of Statistics in this calendar.

MECHANICAL ENGINEERING—Ph.D., M.A.Sc. and M.Eng. degrees.

Professor and Head: Martha E. Salcudean.

Professors: Dale B. Cherchas, Ian S. Gartshore, Edward G. Hauptmann, Philip G. Hill, Muhammad Iqbal, Vinod J. Modi, Geoffrey V. Parkinson, Henry Vaughan.

Associate Professors: Karl V. Bury, Sander M. Calisal, Robert L. Evans, Stanley G. Hutton, Hilton Ramsey, Thomas E. Siddon.

Assistant Professors: A. Bruce Dunwoody, Farrokh Sassani.

Senior Instructor: Donald W. McAdam.

The **M.A.Sc.** is a combined research and course program requiring a total of 15 units. A thesis describing the candidate's research is assigned 3 to 6 units.

The **M.Eng.** degree is awarded for 15 units of course work, 12 of which must be for courses numbered 500 and above, plus a report and comprehensive examination.

The **Ph.D.** combines course work, totaling 18 units beyond the Bachelor's degree level, with research and a thesis. It is normal departmental practise to register students initially for the M.A.Sc. degree; registration as a candidate for the Ph.D. degree may then follow the completion of the Master's program or, if the student's performance is of sufficiently high quality, may be recommended by supervising faculty before completion of the M.A.Sc. A candidate holding a Master's degree from another institution will have the course requirements for the Ph.D. assessed on an individual basis.

Fields of research are: aerodynamics and fluid mechanics; energy conversion, combustion, thermodynamics and heat transfer; vibrations and space dynamics; solid mechanics; bioengineering; design and manufacturing processes; industrial engineering and applied statistics; naval architecture; automatic controls and robotics. A brochure describing current projects is available on request. Applicants for graduate degrees may be considered for appointment as research assistants or demonstrators in the department. Students' courses are selected in consultation with faculty to suit their research or career needs. Not all courses listed in the calendar are offered every year.

MENTAL RETARDATION STUDIES

The Mental Retardation Studies Committee consists of faculty members from several disciplines with special interests in diverse aspects of mental retardation. Representatives from Psychology, Dentistry, Law, Medical Genetics, Nursing, Paediatrics, Pharmaceutical Sciences, Physical Education and Recreation, Psychiatry, Rehabilitation Medicine, Social Work, and Educational Psychology and Special Education compose the committee and pursue teaching or research related to the field within their respective departments.

Although the University does not offer a graduate degree specifically in mental retardation, the committee serves an advisory function, enabling students to discuss and pursue studies or research, particularly of an interdisciplinary nature, concerning mental retardation. The Departments and Schools involved may be those of the committee members, or others appropriate to the special research area proposed. A reference library and study facilities are available on campus in the Berwick Centre. The committee also offers seminars by faculty members and invited speakers on interdisciplinary aspects of mental retardation, and serves as a resource within the University and the community.

Students must satisfy the specific entrance requirements of the faculty(ies) involved as well as the general entrance requirements of the Faculty of Graduate Studies. As the committee has wide representation, studies in this area may have considerable scope, and can be tailored to the needs of the individual students.

Enquiries concerning the activities of the Committee should be directed to Dr. B. C. McGillivray, Department of Medical Genetics, Room 224 - 6174 University Boulevard, University of British Columbia, V6T 1W5.

METALLURGICAL ENGINEERING—Ph.D., M.A.Sc., M.Sc. and M.Eng. degrees

Professor and Head: J. S. Nadeau.

Professors: T. H. Alden, J. K. Brimacombe, L. C. Brown, A. C. D. Chaklader, E. B. Hawbolt, J. A. Lund, A. Mitchell, J. S. Nadeau, E. Peters, E. Teghtsoonian, D. Tromans.

Assistant Professors: R. G. Butters, G. G. Richards, I. V. Samarasekera.

Adjunct Assistant Professor: W. G. Bacon.

A prerequisite for enrolment as a graduate student in the Department is graduation at a high standard in Metallurgical or some other appropriate branch of engineering. Honours graduation in Physics or Chemistry may also be considered as prerequisite for admission.

The Department provides facilities for research in Physical and Chemical Metallurgy, and in Ceramics and Non-Metallic Materials. The currently-active areas are in process analysis, mathematical modelling, hydrometallurgy (leaching of ores and minerals), electrochemistry (including corrosion), pyrometallurgy (slag—and fused salt—metal equilibria), the electroslag process (operating parameters and steady-state phenomena), gas injection, gas-metal interactions, coal liquefaction, solidification (segregation and dendrite development), deformation (structural parameters), dislocation mechanics, diffusion (in alloys and compounds), electron microscopy, creep, fatigue, superelasticity, refractory metal properties, dispersion hardening, composite structures, fine particle strengthening, sintering and creep (of ceramic materials), solid state transitions (in metals and ceramics). The facilities in the Department include a variety of furnaces, testing machines, analytical tools, Scanning Transmission Electron Microscope, Electron Probe Microanalyser, Scanning Electron Microscope, Secondary Ion Mass Spectrometer, metallographs, and specially-designed research apparatus. A brochure may be obtained on application to the Head of the Department describing the facilities and the graduate programs in more detail.

The Centre for Metallurgical Process Engineering

Director: Keith Brimacombe.

The Centre for Metallurgical Process Engineering has been established to facilitate and foster research and graduate training related to metallurgical processes. The Centre encompasses processes in both the ferrous and non-ferrous industries from raw materials preparation to metal finishing. Emphasis is placed on interdisciplinary studies which reflect the complexity of overall process routes and individual unit operations. The Centre actively promotes closer links with the metallurgical industry together with the involvement and support by industry of programs within the Centre.

The Centre has a Board of Management comprising the Dean of Graduate Studies (Chairman), the Deans of Science and Applied Science and the Head of the Department of Metallurgical Engineering.

A Technical Advisory Council with representatives from industry, government and the University has been formed to make recommendations concerning research projects and graduate programs.

MICROBIOLOGY—Ph.D. and M.Sc. degrees

Professor and Acting Head: D. G. Kilburn.

Professors: J. Levy, B. C. McBride, R. C. Miller, Jr. R. A. J. Warren, G. Weeks.

Associate Professors: R. E. W. Hancock, H. S. Teh, G. W. Hoffmann, G. B. Spiegelman.

Assistant Professors: J. T. Beatty, C. R. Bell, D. Syeklocha.

Associate Members: W. Bowie, A. Chow, A. C. Eaves, G. Lee, N. Reiner, D. Speert, F. Takei, P. M. Townsley, D. van Alstyne.

Ph.D. degree

The Department offers opportunities for original research in the areas of molecular and applied microbiology, and cell biology including: molecular biology, molecular genetics, pathogenicity, cellular and tumor immunology, oral microbiology, virology and medical microbiology. The Department has excellent research funding and a commitment towards high quality, modern research. Students will be required to take a Molecular Microbiology Techniques course (MICB 506) as well as a Seminar Course (MICB 530) during their first term in the Department. In addition, they will be required to pass a Comprehensive Examination on topics related to their research area of interest within 18 months of arriving in the Department. Full details of research interests in the department are set out in the Departmental Graduate Handbook obtainable from the Departmental Graduate Applications Committee.

M.Sc. degree

Students will enroll in a Molecular Microbiology Techniques course (MICB 506) and a Seminar Course (MICB 530) in addition to at least 4½ units of other courses. In addition, the student must perform research work under one of the above supervisors and write and defend a thesis based on this research.

CENTRE FOR ADVANCED TECHNOLOGY IN MICROELECTRONICS

Director: L. Young (Electrical Engineering)

This Centre was created to foster graduate student training and research in the design, fabrication and theory of operation of electronic devices, in particular, silicon and gallium arsenide integrated circuits. A solid state microelectronics laboratory in the Department of Electrical Engineering is the core of the present program of the Centre.

The Centre has a Board of Management comprising the Dean of Graduate Studies, the Deans of Science and of Applied Science and the Head of Electrical Engineering.

Applicants for graduate work in the field of applied microelectronics should contact the Director of the Centre.

MINING AND MINERAL PROCESS ENGINEERING—Ph.D., M.A.Sc., and M.Eng. degrees

Professor and Head: G. W. Poling.

Professors: C. O. Brawner, J. S. Laskowski, A. L. Mular.

Associate Professor: H. D. S. Miller.

Assistant Professors: A. E. Hall, A. J. Reed.

Research Opportunities

Mining: Mine property evaluation and mining economics, drilling; rock fragmentation, ore reserve estimation, mine haulage systems, mining systems, mine design optimization. Rock Mechanics; geotechnical instrumentation, slope stability, monitoring techniques, in-situ testing, computer simulation techniques for both underground and open pit mines. Environmental control and protection. Mine ventilation and climatic control.

Mineral processing and coal preparation; Unit operations of: materials transport comminution, classification, solid/solid separations and solid/liquid separations, thickening, filtration, water clarification and purification. Process modeling, plant simulation, process instrumentation, computer control. Flotation: surface chemistry, circuit design and control. Mill: effluent control and pollution prevention, mill tailing disposal. Mill and preparation plant design; surface properties of coal and minerals; fines processing.

Masters' degrees in: 1) Mining Engineering
2) Mineral Process Engineering
3) Coal Preparation Engineering

M.A.Sc. Masters degree in above fields, with research and thesis

M.Eng. Masters degree in above fields, without thesis, available on a part-time basis.

Ph.D. Doctoral degree, with research and thesis.

Admission

Full time and part-time students may enrol in all Masters degree programs.

CENTRE FOR MOLECULAR GENETICS

Acting Director: P. A. Baird.

The Centre for Molecular Genetics has been established by the University in recognition of the fundamental importance of recent developments in this rapidly-advancing field. It is expected that this powerful technology will allow research which leads to applications related to biology and to human disease. It also is expected that the initial emphasis of research in the Centre will be medically related. The Centre serves as a focus for interdisciplinary research, and brings colleagues together who are using recombinant DNA approaches to a variety of problems. It provides a forum for research, teaching and discussion of molecular genetic approaches, which facilitates development at the University in this important area.

Members of the Centre are individuals doing funded research in the field and are drawn from different Departments and Faculties at the University in which the members have a primary appointment. There are also associate members from Simon Fraser University and the University of Victoria. The Centre has a Board of Management and an executive committee which meets monthly. Graduate students are in participating departments or in the Genetics Program in the Faculty of Graduate Studies. Monthly Scientific Seminars are held.

MUSIC—Ph.D., D.M.A., M.A., and M.Mus. degrees.

Professor and Head: William E. Benjamin.

Professors: Wallace Berry, H. Robert Cohen, Dimitri E. Conomos, Paul M. Douglas, James L. Fankhauser, Cortland R. Hultberg, John A. Loban, Hans-Karl Piltz, Robert Rogers, Robert Silverman, French A. Tickner.

Associate Professors: Martin C. Berinbaum, Alexandra Browning-Moore, Gregory G. Butler, Jane A. Coop, Stephen G. Chatman, J. Evan Kreider, John E. Sawyer, James R. Schell, Douglas E. Talney, Eugene N. Wilson.

Assistant Professors: Donald G. Brown, John B. Roeder, Alan R. Thrasher, Eric J. Wilson.

The department has the assistance of at least 40 part-time faculty, many of whom are principals of the Vancouver Symphony Orchestra.

The M.A. degree may be earned in musicology or music theory; the M.Mus. degree in composition, performance, and opera. The D.M.A. degree is available for exceptionally qualified candidates in performance and in composition. The Ph.D. degree is offered for the most advanced level of scholarly studies and research in musicology, culminating in advanced research and dissertation which may assume an essentially historical or theoretical orientation, with the certification of degree form reflecting this distinction.

In musicology and music theory, majors acquire essential knowledge and skills in historical and/or theoretical research to prepare them for further advanced studies. Composition majors concentrate in creative studies.

In performance, the major concentrations include piano, organ, voice, most orchestral instruments, and certain historical instruments. Opera majors specialize in musical and dramatic techniques of operatic performance and production to gain basic experience in singing, acting, conducting, coaching, and technical stagecraft.

The thesis for the Master of Music and Doctor of Musical Arts degrees in music performance consists of public performance in varying combinations of solo recital, ensemble recital, operatic roles, and/or lecture-recital, depending upon the particular field of study. Doctoral study in music performance requires a supplementary document in addition to recitals and other stipulated media of presentation. The Department of Music should be consulted for specific information in these connections.

The thesis for the Master of Music degree in composition is a recital of original works composed during graduate study; for the D.M.A. in composition it is a major original work and a supplementary document related to that work.

The department occupies the well-equipped Music Building. Included are a recital hall, two rehearsal halls, 32 practice rooms, a sophisticated electronic music studio, an electronic group piano laboratory, a music library, seminar rooms, and teaching studios.

The Music Library contains some 60,000 music scores and books, 4,000 microfilms of European musical sources, 10,000 recordings, and 150 periodicals.

The department maintains an excellent assortment of instruments, including 125 pianos, several important violins, a 64-rank pipe organ by Casavant Frères (1969), a fine collection of historical instruments, and a growing collection of Japanese, Chinese, Korean and Indian classical instruments. The Centre for Studies in 19th-Century Music (see below) is a resource of vital interest to graduate students in musicology.

CENTRE FOR STUDIES IN 19TH-CENTURY MUSIC
Centre international de recherche sur la presse musicale (CIRPM)

Director: H. Robert Cohen

Director of Archive: Hans Burndorfer

General Secretary: Richard Kitson

Established in 1981 by action of the Faculty of Graduate Studies and the University Senate, the Centre operates under the auspices of the International Musicological Society and the International Association of Music Libraries — and in collaboration with a European research centre pursuing parallel goals, located in Parma, Italy.

Counselled by an International Advisory Board composed of distinguished scholars and archivists from Belgium, Canada, England, France, West Germany, Hungary, Italy, Poland, Portugal, Sweden and the United States, and a UBC based Advisory Committee composed of 19th-century scholars from the Departments of English, French, German, History, Theatre, and Music, the Centre's Director reports to the Dean of the Faculty of Graduate Studies and the Dean of the Faculty of Arts.

Over three thousand 19th-century journals, newspapers and reviews chronicle, in a detailed manner, musical activities during the Romantic era. Yet this monumental resource has remained in large part unexplored, as libraries possessing the periodicals are few and indexes permitting their systematic examination all but non-existent. Succinctly stated, the Centre's aims are: (1) to direct attention to this unique resource for musicological research through the publication of a journal entitled *Periodica Musica*; (2) to develop a research archive of 19th-century periodical literature dealing with music and musical life; (3) to permit faculty and graduate students to pursue significant research activities within a clearly-defined, internationally-sanctioned structure; (4) to catalogue and index 19th-century writings on music and musical iconography in periodicals; (5) to oversee the publication of the resulting reference volumes in *Le Répertoire international de la presse musicale (RIPM)*.

NEUROSCIENCE—Ph.D. and M.Sc. degrees

Chairman: H. C. Fibiger (Division of Neurological Sciences, Department of Psychiatry)

Although there is no Department of Neuroscience at U.B.C., studies leading to the M.Sc. and Ph.D. degrees in Neuroscience are available. The Neuroscience Program is administered by the Neuroscience Advisory Committee which is responsible to the Dean of the Faculty of Graduate Studies.

The Neuroscience Program is a flexible one intended to accommodate the diverse background of students wishing to enter it, and also take into account the broad nature of neuroscience research. The program will accept for advanced degrees candidates with undergraduate majors in a variety of disciplines including but not restricted to Biology, Biochemistry, Computer Sciences, Engineering, Mathematics, Neurosciences, Pharmacology, Physics, Physiology, Psychology and Zoology. Graduates with a professional degree (M.D., D.M.D., D.V.M.) may also be accepted into the program. Acceptance into the program is dependent upon (a) meeting the general entrance requirements of the Faculty of Graduate Studies, (b) acceptance by the Neuroscience Admissions Committee, and (c) obtaining a letter of acceptance from an individual department.

The student's graduate program will be decided upon by the student, the adviser and the student's committee. The formal requirements in this regard, other than those set forth by the Faculty are as follows. The program will aim for flexibility so that the individual needs of students with different interests in neuroscience can, as far as possible, be accommodated. Course requirements will normally be taken in the first two (2) years of the program. During the first year, however, all students should participate in a core program consisting of courses in (1) Neuroanatomy, (2) Neurophysiology, (3) Neurochemistry/Neuropharmacology and Behavioral Neurobiology. Courses taken at other universities or in the undergraduate program at U.B.C. will be taken into consideration in planning the student's core course curriculum. With these courses as a base, additional advanced course and seminar requirements will vary with the particular interests and needs of the student as determined by the student and his Supervisory Committee.

Additional information on the graduate program in Neuroscience can be obtained directly from the Chairman of the Neuroscience Graduate Program, or from the Dean of Graduate Studies.

NURSING—M.S.N. degree

Professor and Director: Marilyn D. Willman.

Professor: Margaret A. Campbell.

Associate Professors: Joan Anderson, Sheila M. Stanton.

Assistant Professors: Elaine Carty, Ruth Elliott, Janet Gormick, Clarissa Green, Carol Jillings, JoAnn Perry, Kathleen Simpson, Raymond Thompson.

Requirements:

a) graduation from a baccalaureate program in nursing which included community health nursing, psychiatric nursing, and statistics. (Applicants with registered nurse qualifications and a baccalaureate degree in a related field may be admitted at the discretion of the School).
b) sufficient nursing experience to ensure an acceptable level of competence in nursing.
c) additional courses or reading in biological and physical sciences may be required of students wishing to become clinical nurse specialists.

The Program:

Students may choose to complete (a) 24 units of course work and a thesis of 3 units or (b) 27 units of course work, at least one major essay and a comprehensive examination.

OBSTETRICS AND GYNAECOLOGY—Ph.D. and M.Sc. degrees (Human Reproductive Biology)

Professor and Head: Victor Gomel.

Program Director: Y. S. Moon.

Professors: S. B. Effer, P. Hahn, B. Ho Yuen.

Associate Professors: C.-Y. G. Lee, Y. S. Moon, D. Rurak, B. K. Wittmann.

Assistant Professors: D. F. Farquharson, J. F. King, P. C. K. Leung, P. F. McComb, T. C. Rowe.

Associate Members: J. T. Emerman, S. Innis, J. P. Skala.

The Department of Obstetrics and Gynaecology offers M.Sc. and Ph.D. programs in several areas of human reproductive biology, including female and male reproductive endocrinology, immunology of reproduction, fertilization and early embryonic development, perinatal metabolism, and fetal and neonatal physiology. Facilities exist for animal research employing both small (mice, rats, rabbits, guinea-pigs) and large (sheep) animal species. In addition, there are opportunities for research involving human reproduction and pregnancy, in collaboration with clinical members of the department. Credit for the following courses or their equivalents as prerequisites must have been obtained: Biochemistry 300; one of Physiology 301, Zoology 303 or Animal Science 320.

OCEAN STUDIES COUNCIL

The Ocean Studies Council consists of faculty members from a number of disciplines with research interests in various aspects of the oceans. Representatives from the Faculties of Commerce, Forestry, Graduate Studies, and Law; from the Departments of Anthropology and Sociology, Bio-Resource Engineering, Economics, Geography, Mathematics, Oceanography, Physical Education, Political Science and Slavonic Studies; and from the following institutes: Animal Resource Ecology, Asian Research, International Relations and Westwater Research; and other groups with related interests constitute the Council.

The Council has as its primary function the promotion of interdisciplinary research on ocean matters within the University. The Council serves as well to facilitate contacts between scholars at U.B.C. concerned with ocean research and other universities, government bodies, international agencies and other interested groups off-campus. While the Council has no role in teaching or the development of curricula it does act to develop interedisciplinary seminars on ocean topics for both faculty and graduate students.

OCEANOGRAPHY—Ph.D. and M.Sc. degrees

Professor and Head: S. E. Calvert.

Professors: R. L. Chase, P. H. LeBlond, A. G. Lewis, T. R. Parsons, G. S. Pond, F. J. R. Taylor.

Honorary Professors: W. M. Cameron, G. L. Pickard, R. W. Stewart.

Associate Professors: R. J. Andersen, W. J. Emery, E. V. Grill, P. J. Harrison.

Assistant Professor: T. F. Pedersen.

Associate Members: G. C. Hughes (Botany), R. M. Clowes (Geophysics).

A program of study in Oceanography was initiated at The University of British Columbia in 1949 in an Institute within the Faculty of Graduate Studies; Oceanography became a Department in the Faculty of Science in 1979.

Oceanography is concerned with the biology, chemistry, geology and physics of the sea. Many of the phenomena which occur can be understood only through the simultaneous application of more than one of these disciplines. Thus, oceanographic research often requires cooperative multidisciplinary studies by researchers whose training includes relevant aspects of the different scientific disciplines. The Department offers programs for the training of oceanographers in research and in the scientific background appropriate to resource surveying and management to meet the needs of the oceanographic community in government, industry and university.

The faculty also engage in fundamental research in oceanography, both independently and in cooperation with federal government laboratories. For such work access is readily available to many different oceanographic regimes occurring along the coast of British Columbia: fjords, the inland sea of the Strait of Georgia, the coastal region of the North Pacific, and the North Pacific Ocean itself. The types of oceanographic problems that can be studied include: estuarine processes, satellite remote sensing, coastal upwelling, ocean circulation including modelling, plate tectonics, marine geochemistry, natural product chemistry, plankton ecology and physiology, and primary organic production of the sea. Field studies at sea are also carried out in other regions of the world ocean.

Programs leading to both Ph.D. and M.Sc. degrees are offered. Students must satisfy the admission requirements of the Faculty of Graduate Studies and normally should have a Bachelor's or Master's degree in some area of science or applied science. The Ph.D. program consists of appropriate course work chosen in consultation with the candidate's Committee and the preparation of a thesis based on the results of original research. The M.Sc. program consists of 3 or 6 units of thesis and 9 or 12 units of course work, or 15 units of course work and an essay.

Students in oceanography normally are required to take Oceanography 308, 309, 401 or 405, and 503 unless they have previously taken equivalent courses. Graduate students in physical oceanography will substitute Oceanography 514 for Oceanography 401, those in biological oceanography will substitute Oceanography 506 and/or 507 and/or 509 for Oceanography 309. Additional courses to complete the student's program will be chosen in consultation with the candidate's committee.

Students in Oceanography may select courses, depending on their interest, from the following areas of specialization:

Biological Oceanography
Chemical Oceanography
Geological and Geophysical Oceanography
Physical Oceanography and Meteorology

Courses related to Oceanography are also offered in the Departments of Botany, Chemistry, Geological Sciences, Geophysics and Astronomy, Physics and Zoology.

Oceanography students normally begin their studies in September but may sometimes arrange to start their thesis work in the summer before their first winter session. A student wishing to do graduate work in Oceanography should first discuss the proposed program with appropriate Faculty in the Department. Inquiries for further information should be sent to the Head.

Applications for admission are made to the Dean of Graduate Studies and should, if possible, be made before January 1 of the year the student wishes to enter. Later

applications will be considered but may not be successful because of limited facilities.

ORAL BIOLOGY—Ph.D. degree

Professor and Head: B. C. McBride.

Professors: D. M. Brunette, A. G. Hannam, L. Kraintz, J. Tonzetich.

Associate Professor: R. M. Shah.

Assistant Professor: J. D. Waterfield.

Conjoint Associate Professor: E. Puil.

Associate Members: T. R. L. Gould (Oral Medicine), A. A. Lowe (Orthodontics), V. M. Diewert (Orthodontics).

The department offers the opportunity for advanced study in a number of areas related to oral biology including: oral and cellular immunology, basic and applied biology of cells of the periodontium, oral microbiology, craniofacial growth and development, oral sensorimotor function and connective tissue biochemistry. The department has good research funding and is well equipped to carry out advanced research. Students will normally be required to take ORBI 500 (Research Seminars in Oral Biology), ORBI 501 (Craniofacial Biology) and ORBI 502 (Biology of Oral Tissues) during their first year. In addition students wil be required to pass both a written and an oral comprehensive examination. The program will be open to those who have completed a D.D.S., D.M.D., M.D., D.V.M. or their equivalents and to students who have obtained an M.Sc. in Dental Science or a related discipline.

Further information can be obtained by contacting the Head of the Department of Oral Biology.

PATHOLOGY—Ph.D. and M.Sc. degrees

Professor and Head: David F. Hardwick.

Professors: J. D. Anderson, A. P. Autor, K. Berry (Clinical), D. E. Brooks, William H. Chase, Clarisse L. Dolman (Clinical), William L. Dunn, E. Evans, J. A. J. Ferris, J. C. Hogg, J. B. H. Hudson, M. T. Kelly, D. M. McLean, Richard H. Pearce, Philip E. Reid, F. J. Roberts (Clinical), Jack Rootman, Fernado A. Salinas (Clinical), J. A. Smith, Ralph W. Spitzer (Clinical), William M. Thurlbeck, Joseph Tonzetich (Honorary), Ann J. Worth (Clinical).

Associate Professors: V. J. Baldwin, Donald J. Campbell, A. M. Churg, James E. Dimmick, Allen C. E. Eaves, J. Frohlich, William Godolphin, George R. Gray (Clinical), R. S. Hill, D. Kalousek, A. B. Magil, R. T. Morrison, David Owen, Louis D. Wadsworth (Clinical), William S. Wood.

Assistant Professors: M. Bernstein, W. J. Boyko (Clinical), Shirley Gillam, J. L. Isaac-Renton, L. T. Kirby, G. Krystal, Gillian Lockitch, P. Olive, Branko Palcic (Hon.), P. H. Pritchard, Morris R. Pudek (Clinical), M. Rosin (Clinical), D. W. Seccombe (Clinical), R. V. Shah (Hon.), Anne Skidmore, F. Takei, David Walker, J. L. Wright.

Associates: Mark Adams, Derek A. Applegarth, N. Auersperg, Eaves, C. J. Eaves, Sheila M. Innis, W. Nowaczynski, J. Oger, Peter Pare, Stephen Sachs, Ralph Schellenberg, H. F. Stich, Aubrey J. Tingle, W. J. Tze, Diane van Alstyne.

Registration in any graduate course in pathology requires the consent of the Department. Candidates with B.Sc. degree intending to proceed to the M.Sc. or Ph.D. normally require Biochemistry 300, Physiology 301 and Anatomy 501 or their equivalents. If possible, students considering application for admission to the department should arrange an interview with the Graduate Adviser during the fall term of their final undergraduate year.

PHARMACEUTICAL SCIENCES—Ph.D. and M.Sc. degrees

Professor and Dean: J. H. McNeill.

Professors: James E. Axelson, Gail D. Bellward, Jack Diamond, Donald M. Lyster, J. N. Hlynka, Sidney Katz, Alan G. Mitchell, Brian Pate, Janis O. Runikis, Basil D. Roufogalis, John G. Sinclair.

Associate Professors: Frank S. Abbott, Terence H. Brown, David Fielding, Keith M. McErlane.

Assistant Professors: Helen Burt, Robin Ensom, Allan M. Goodeve, Marc Levine, J. Glen Moir, James M. Orr.

Senior Instructor: Leona R. Goodeve.

The Faculty of Pharmaceutical Sciences offers opportunities for advanced study leading to the degrees of Master of Science and Doctor of Philosophy in the fields of Biopharmaceutics, Clinical Pharmacy, Pharmaceutics, Pharmaceutical Chemistry (including Medicinal Chemistry and Natural Products), Pharmacology, Toxicology, and Bionucleonics.

Research facilities include laboratories in each of the major areas of concentration and the equipment necessary to complete satisfactorily assigned projects. The type of equipment available for research includes mass spectrographs, computers, recording spectrophotometers, titrimeters, stability chambers, environmental chambers, gas and liquid chromatographic equipment and apparatus for the measurement of radioactive compounds.

Subject to evidence of capacity for graduate work, the program is open to those holding undergraduate degrees from recognized universities, whether in pharmacy or other related disciplines. Those holding undergraduate degrees will normally be required to complete the Master of Science degree. However, students with exceptional academic records may be permitted to proceed directly to the Ph.D. degree.

A detailed brochure is available on application to the Faculty describing its graduate degree programs.

PHARMACOLOGY AND THERAPEUTICS

Professor and Head: Morley C. Sutter.

Professors: James G. Foulks, David V. Godin, Thomas L. Perry, David M. J. Quastel.

Associate Professors: Sastry S. R. Bhagavatula, Gordon E. Dower, Ernest Puil, Robert E. Rangno, Harvey D. Sanders, Rudolf Vrba, Michael J. A. Walker, Richard A. Wall, James M. Wright.

Assistant Professors: Alfred Fessler, Catherine C-Y Pang.

PHARMACOLOGY—Ph.D. and M.Sc. degrees

Ph.D. degree

Facilities are available for original investigation in certain fields of pharmacodynamics, including cellular, biochemical, autonomic, cardiovascular, clinical, and neuro-pharmacology. Pharmacokinetic and drug metabolism studies also can be arranged.

M.Sc. degree

Prerequisite: An M.D. degree; or a Bachelor's degree with Honours (or equivalent scholastic standing). Credit must have been obtained for Organic Chemistry (Chemistry 203 or 230) and Elementary Physics (Physics 110 or equivalent). Physical Chemistry (Chemistry 304 or 305) and Bio-physics (Physics 404) also are recommended.

Course: If not already taken, Physiology 400, or 301 and 302; Biochemistry 300 or 301; Pharmacology 425; Thesis, counting 6 units, and courses in related fields selected in consultation with the Department.

PHILOSOPHY—Ph.D. and M.A. degrees

Acting Head: Peter Remnant.

Professors: Samuel C. Coval, James C. Dybikowski, Thomas E. Patton, Peter Remnant, Robert J. Rowan, Richard I. Sikora.

Associate Professors: Howard Jackson, Edwin Levy, Richard E. Robinson, Steven Savitt.

Assistant Professors: John P. Stewart, Gary A. Wedeking, Earl R. Winkler.

Senior Instructor: Elbridge N. Rand.

Adjunct Professor: Philip P. Hanson.

The Department undertakes doctoral work in epistemology, metaphysics, ethics, aesthetics, political philosophy, logic, philosophy of language, philosophy of science, philosophy of mathematics and the history of philosophy.

Prerequisites: Philosophy 301; 302; 3 units from 333, 343, 353, 363; 3 units from 420, 450 or 451 but not both, 460, 470; or their equivalents.

PHYSICAL EDUCATION—M.P.E. degree

Professor and Head: W. Robert Morford.

Professors: Eric F. Broom, Stanley R. Brown, Robert W. Schutz.

Associate Professors: F. Alex Carre, Douglas B. Clement, Kenneth D. Coutts, Ian M. Franks, Richard S. Gruneau, Donald McKenzie, Richard E. Mosher, Edward C. R. Rhodes, Barbara Schrodt, Gary D. Sinclair, E. Taunton, Patricia Vertinsky.

Assistant Professors: Sharon A. Bleuler, Bonita C. Long, Moira Luke, Robert E. C. Sparks.

Prerequisite: Bachelor's degree in Physical Education, Kinesiology, or other related field of study.

M.P.E. Course: a total of 18 units, with or without thesis; required advanced courses in Physical Education, and courses in other departments.

PHYSICS—Ph.D., M.Sc. and M.A.Sc. degrees

Professor and Head: D. Llewelyn Williams.

Professors: B. Ahlborn, E. G. Auld, D. A. Axen, D. A. Balzarini, A. J. Barnard, Robert Barrie, B. Bergersen, A. J. Berlinsky, M. Bloom, M. K. Craddock, F. L. Curzon, F. W. Dalby, J. E. Eldridge, K. L. Erdman, A. V. Gold, P. C. Gregory, G. M. Griffiths, Herbert P. Gush, R. R. Haering, W. N. Hardy, M. D. Hasinoff, R. R. Johnson, Garth Jones, P. H. LeBlond, Malcolm McMillan, P. W. Martin, D. F. Measday, J. Meyer, I. Ozier, R. R. Parsons, G. S. Pond, P. Rastall, C. F. Schwerdtfeger, W. L. H. Shuter, L. Skarsgard, L. de Sobrino, B. G. Turrell, W. G. Unruh, E. W. Vogt, B. L. White.

Associate Professors: D. S. Beder, J. H. Brewer, J. F. Carolan, M. J. C. Crooks, G. W. Hoffmann, Roger Howard, W. H. McCutcheon, P. W. Matthews.

Assistant Professors: Betty Howard, Alex MacKay, Andrew Ng, P. Palffy-Muhoray (Honorary), N. Weiss.

Associate Members: E. Evans (Pathology), G. K. Y. Lam (Pathology), B. Palcic (Pathology).

Ph.D. degree

The Department offers opportunities for study in the following major fields:

(a) *Theoretical Physics:*
Elementary particles
Statistical mechanics
Properties of semiconducting solids
Intermediate energy nuclear physics
Gravitation
Properties of liquid crystals
Quantum field theory
Theory of disordered materials

(b) *Radio Astronomy:*
Observational and interpretive studies of the interstellar medium, star formation, galactic kinematics, dynamics and structure, variable radio sources supernova remnants, extragalactic radio sources using various radio telescopes around the world.

(c) *Magnetic Resonance:*
Application of NMR techniques to model and biological membranes. NMR in metallic crystals and ferromagnetic alloys and hyperfine interactions using nuclear orientation.

(d) *Plasma Physics:*
Optical studies of dense, hot plasmas. Interaction with intense pulsed laser beams, including stimulated scattering. Laser physics and pulsed laser development. Shocks and heat waves. End losses from linear fusion devices. Plasma spectroscopy with emphasis on line broadening. Physics of ac and dc arcs. Experimental studies of instabilities in plasmas and liquids.

(e) *Nuclear and Particle Physics with the Tri-University Meson Facility (TRIUMF):*
On the U.B.C. South Campus scientists from four universities (Alberta, British Columbia, Simon Fraser and Victoria) jointly operate a meson factory. The accelerator is a sector-focussed cyclotron which accelerates 100*u*A of protons to 500 MeV in order to produce pions and muons. Also available is 100 uA of polarized protons, variable in energy from 180 MeV to 520 MeV. This beam can be used to produce an intense flux of polarized neutrons of about the same energy. Experiments are being performed on the fundamental properties of particles and nuclei together with studies of condensed matter using muons as a probe (*u*SR).

(f) *Semiconductor Physics and Optical Properties of Solids:*
Electron paramagnetic resonance in Solids. Far-infrared spectroscopy of electronic and vibrational transitions in solids, in particular study of quasi-one-dimensional organic conductors and insulators. Laser annealing. Magnetron sputtering of expitaxial films.

(g) *Low-Temperature Physics:*
Spin-polarized atomic hydrogen. Low temperature frequency standards such as cryogenic hydrogen masers and cooled cavity oscillators. Nuclear Orientation. Properties of liquid helium near the superfluid transition.

(h) *Spectroscopy:*
Experimental cosmology. Forbidden rotational spectra. High resolution infrared studies. Laser spectroscopy and fluorescence studies. Stimulated scattering of light from gases and liquids.

(i) *Electronic Properties of Metals:*
The Fermi surface and other related physical properties of conduction electrons in pure metals are studied by a variety of experimental techniques including the de Haas-van Alphen effect and nuclear magnetic resonance.

(j) *Critical Phenomena:*
Experimental investigations by optical means of the critical regions of pure fluids, binary fluids, and liquid crystals. Interferometric and light scattering techniques are used to measure the parameters which characterize these fluids near phase transitions.

(k) *Energy Research:*
New electrical energy storage systems, based on the intercalation of alkali metal ions into appropriate host lattices, are being investigated.

(l) *Biophysics:*
Cancer research in radiation biophysics.
Diagnostic use of doppler shift in scattered light to measure blood flow in retinal vessels.
NMR and photoluminescence of membranes.
Modelling of self-organizing and self-regulating biophysical systems (e.g. the immune system).

A brochure describing the research facilities in more detail is available on request from the Department of Physics.

M.Sc. degree
Prerequisite: Honours in Physics (single or combined) or Mathematics; or Bachelor's degree with at least upper Second Class (72%) standing in Engineering Physics; or Bachelor's degree with a Physics Major, with First Class standing.

M.A.Sc. degree (Engineering Physics)
Prerequisite: Graduation in Honours Physics, Engineering Physics or Electrical Engineering.

Both the M.Sc. and M.A.Sc. programs require a minimum of 15 units with the thesis counting 6 units and normally at least 6 units from graduate courses in physics, although for those students interested in inter-disciplinary fields this may be reduced to 4 units with permission of the department.

Ph.D. degree
Prerequisite: Master of Science (or Master of Arts) in Physics, or Master of Applied Science (or Engineering) in Engineering Physics. After a year's residence at U.B.C. and 9 units of course work with an overall first class average and clear evidence of research ability, well-qualified M.Sc. or M.A.Sc. candidates may be transferred directly to a Ph.D. program.

PHYSIOLOGY—Ph.D. and M.Sc. degrees

Professor and Head: J. R. Ledsome.

Professors: David V. Bates, John C. Brown, Ralph Keeler, Franco Lioy, Hugh McLennan, J. A. Pearson, J. J. Miller, R. A. Pederson.

Associate Professors: Carl F. Cramer, E. C. Cameron, C. H. S. McIntosh, P. C. Vaughan, N. Wilson.

Assistant Professors: K. G. Baimbridge, A. Buchan, N. Kasting, D. A. Mathers.

Associate Members: P. C. K. Leung, M. D. Low, G. A. Quamme, D. W. F. Schwarz, S. Vincent.

Ph.D. degree
The Department offers opportunities for advanced study and research in many branches of vertebrate physiology, and is particularly strong in the areas of neurophysiology, gastroenterology, endocrinology and cardiovascular physiology. A brochure describing the research activities in more detail is available upon request from the Department.

Prerequisite: A M.Sc. degree in Physiology or closely related field; a B.Sc. degree with First Class Honours in Physiology; or an M.D., D.M.D. or D.V.M. degree with adequate standing and approval by the Head of the Department.

M.Sc. degree
Opportunities for research training as above.

Prerequisite: A B.Sc. degree with standing in Physiology or a related subject defined by the Faculty of Graduate Studies; or an M.D., D.M.D. or D.V.M. degree.

Courses: Physiology 422, 423, 424, 426 and 430 or their equivalents if not already taken; plus a minimum of 6 units at the 500 level, and thesis (6 units).

PLANT SCIENCE—M.Sc. and Ph.D. degrees

Professor and Head: V. C. Runeckles.

Professors: G. W. Eaton, M. Shaw.

Honorary Professor: M. Weintraub (Agriculture Canada).

Associate Professors: R. J. Copeman, F. B. Holl, P. A. Jolliffe, Judith H. Myers, M. D. Pitt.

Assistant Professors: L. Diamond, M. B. Isman, N. R. Knowles, P. A. Miller, C. R. Norton, D. D. Paterson, M. Quayle, M. K. Upadhyaya.

Adjunct Professors and Honorary Lecturers from other institutions: W. T. Cram, H. A. Daubeny, S. DeBoer, A. R. Forbes, B. D. Frazer, S. Freyman, R. I. Hamilton, G. G. Jacoli, N. E. Looney, H. R. MacCarthy, R. Martin, H. S. Pepin, H. W. J. Ragetli Jr., J. Raine, R. Stace-Smith, J. H. Tremaine, T. C. Vrain, (Agriculture Canada).

The Department offers advanced study in the fields of environmental plant physiology, air pollution effects, the biology and control of weeds, various branches of horticulture, plant genetics, plant pathology, the ecology of forage and range, wildlife habitat, the physiology, behaviour and dispersal of insects, and various aspects of landscape architecture. Laboratories, greenhouses and campus land resources support a wide range of research on agronomic and horticultural crops, range and weed species, the mode of action of herbicides and air pollutants, biological nitrogen fixation, plant diseases, and insect pests. Special equipment items available for research are controlled environment growth chambers and gas analyzers; facilities for the artificial induction of mutations and for isotopic tracer studies are available; facilities are available for the study of plant host-parasite relations and for applied entomology, including an insectary.

In certain fields, advanced study may be arranged with other Departments, notably with Soil Science in plant-soil relationships, with Animal Science in forage physiology, and with Zoology in wildlife biology. Close associations are maintained with the research stations of Agriculture Canada located on the campus and elsewhere in Western Canada.

Courses:

Prerequisites: A Bachelor's degree with courses in fields of study acceptable to the Department.

In addition to the Ph.D. program, two M.Sc. programs are offered: the M.Sc. with Thesis and the M.Sc. with Comprehensive Examination. Both are available to part-time students. The part-time M.Sc. with Comprehensive Examination is particularly valuable to those in plant industry and extension work wishing to obtain a higher degree.

POLITICAL SCIENCE—Ph.D. and M.A. degrees

Professor and Head: David J. Elkins.

Professors: Donald E. Blake, H. Alan C. Cairns, George A. Feaver, K. J. Holsti, Robert H. Jackson, Jean A. Laponce, W. J. Stankiewicz, Michael D. Wallace, Mark W. Zacher.

Associate Professors: Keith G. Banting, Peter A. Busch, R. Kenneth Carty, Richard G. C. Johnston, Paul J. Marantz, Philip Resnick, Paul R. Tennant, John R. Wood.

Assistant Professor: Heath B. Chamberlain.

The Department offers opportunities for advanced study in the major fields of Political Science. It is particularly strong in Canadian Politics, British Columbia Politics, International Relations, Political Development and non-Western Politics with special reference to Asia. The library is a depository for United Nations, Canadian Government, British Columbia Government, and most U.S. Government documents. The library is especially strong in Soviet and Communist Studies, Asian Studies, and Canadian Government. The University is a member of the Inter-University Consortium for Political Research (Ann Arbor), and belongs to the International Survey Library Association (Storrs, Ct.). Computer facilities are available; the Data Library has the largest collection of machine-readable material in Canada.

A detailed brochure is available on application to the Department describing its programs for the Ph.D. and M.A. degrees.

PORTUGUESE—(see Hispanic and Italian Studies)

POULTRY SCIENCE—(see Animal Science)

PSYCHIATRY—M.Sc. degree

Head: James E. Miles

Professors: Morton Beiser, Hans C. Fibiger, Harry Klonoff, Tsung-yi Lin, Edward L. Margetts, Edith G. McGeer, Patrick L. McGeer (Leave of Absence), Peter McLean, James E. Miles, Shan Sung, James S. Tyhurst, Juhn A. Wada, Neil Yorkston.

Associate Professors: William T. Brown, Stuart Fine, Anthony Marcus, C. Schwarz, Alexander Jakubovic, Robert Krell, William Maurice, Hamish Nichol, Ralph Shulman, P. Susan Penfold, Athanasios P. Zis.

Assistant Professors: Jonathon Fleming, Trevor Hurwitz, Barry Jones, Keith Marriage, Steven Vincent.

Clinical Professors: Andrew N. McTaggart, James E. Runions, Tibor Bezereoi, Peter Bunton, Peter Freeman, Wolfgang Jilek, Robert Pos, Leslie Solyom.

Clinical Associate Professors: Raymond Ancill, Victor Banno, Sadi Bayrakal, Earl Haroin, Louise M. Jilek-Aall, Jirina Knobloch, Christopher Morrant, Michael Myers, Ronald Remick,Roy Slakov.

Clinical Assistant Professors: Patricia Diewold, Philip Adilman, Charles R. Brasfield, Ronald Braunstein, Alan Buchanan, Jay C. Cheng, Brian Harris, Aboulkarim Jiwa, George Kovacs, Frank Loomer, Donald E. Louie, Shaila Misri, Brian Morris, Janine O'Kane, Hugh L. Parfitt, Kathleen Parfitt, Carl Rothchild, Jaime Smith, Frances Wilt.

Clinical Instructor: H. Davis, Charles Gregory, Robert Halliday, Lorraine Haskell, Theresa Kope, Roy O'Shaughnessy, Oliver Robinow, Michael Roburn, Patricia Schwartz, Madeleine Tremblay, Diane Watson, John Whelan.

Lecturers from other Departments: John H. V. Gilbert (Paediatrics), David C. Kendall (Paediatrics), David Quastel (Pharmacology), Robert S. Ratner (Anthropology and Sociology), R. A. H. Robson (Anthropology and Sociology).

For prerequisites and courses consult the Department.

Required courses for the degree include Psychiatry 500, 501, 510, 520, 530, 540 and other courses designated by the Department.

PSYCHOLOGY—Ph.D. and M.A. degrees

Professor and Head: Richard C. Tees.

Professors: Michael Chandler, Stanley Coren, K. D. Craig, Ralph Hakstian, Robert D. Hare, Daniel Kahneman, Douglas T. Kenny, Romuald Lakowski, A. G. Phillips, J. P. J. Pinel, S. J. Rachman, Peter Suedfeld, Anne Treisman, Jerry Wiggins, R. Wong.

Associate Professors: David J. Albert, D. Susan Butt, R. S. Corteen, D. G. Dutton, Boris Gorzalka, Robert E. Knox, R. McMahon, Demetrios Papageorgis, J. Russell, J. Steiger, L. Walker, Lawrence Ward, D. M. Wilkie, Tannis MacBeth Williams, John Yuille.

Assistant Professors: Lynn Alden, J. Campbell, K. Dobson, G. J. Johnson, W. Linden, J. Metcalfe, D. Paulhus, Reva Potashin, P. Smith, F. P. Valle.

The Department offers opportunities for advanced study in the following areas of specialization:

(a) Biopsychology
(b) Clinical
(c) Developmental
(d) Perception and Cognition
(e) Personality
(f) Social
(g) Environmental
(h) Psychometrics

The graduate program in psychology provides exposure to ongoing research projects in each of its areas of specialization (see above). M.A. and Ph.D. degrees are awarded only to those students who acquire: (1) a detailed knowledge of the current research findings in their area of specialization, (2) a knowledge of the concepts and issues in other selected areas of psychology and (3) the ability to conduct original research of high-quality. In addition to the above requirements, clinical students must develop an acceptable level of clinical skill, and must serve an internship in an applied setting as part of their Ph.D. program. A brochure describing the psychology graduate program in more detail can be obtained by writing to the psychology graduate secretary. Also available from the same source are brochures providing detailed information concerning each of the areas of specialization.

PULP AND PAPER ENGINEEERING—M.Eng. degree

Program Coordinator: K. L. Pinder, Chemical Engineering.

Associate Program Coordinator: R. J. Kerekes, PAPRICAN.

Board of Study: M. S. Davies (Electrical Engineering); E. G. Hauptmann (Mechanical Engineering); R. W. Kennedy (Forestry); D. Tromans (Metallurgical Engineering); R. M. R. Branion (Chemical Engineering); G. Dumont (PAPRICAN); L. R. Galloway (Chemical Engineering) and two student representatives.

Ex Officio: B. Bowen (Chemical Engineering); P. Suedfeld (Faculty of Graduate Studies).

A program in pulp and paper engineering leading to an M.Eng. degree is offered to qualified engineering graduates seeking to acquire postgraduate training for the practice of engineering in the pulp and paper industry. The program is designed primarily for students with at least two years experience in the pulp and paper industry, or summer experience and courses in pulp and paper technology equivalent to Chemical Engineering 470 and 471.

Prerequisite: Graduation or equivalent in Chemical Engineering, Electrical Engineering, Mechanical Engineering, or Metallurgical Engineering. Graduates from other branches of engineering may be accepted on approval by the program coordinator.

Program: Required courses are six units of graduate pulp and paper courses, two units of lab courses plus seven units and a project with an essay in a field of specialization. Present fields of specialization are Pulping, Papermaking, and Systems and Control.

This program is offered in collaboration with the Pulp and Paper Research Institute of Canada.

RELIGIOUS STUDIES—Ph.D. and M.A. degrees

Professors: Hanna E. Kassis, C. G. William Nicholls.

Associate Professors: Charles P. Anderson, N. Keith Clifford, Shotaro Iida.

Assistant Professor: Paul G. Mosca (Graduate Adviser).

Lecturer from another Department: Leon Hurvitz (Asian Studies), Daniel L. Overmyer (Asian Studies).

The Department of Religious Studies offers courses leading to the degree of Master of Arts. Candidates may choose any one of the following areas of concentration: Religions of South and East Asia; Biblical Studies; Judaic Studies; Christian Thought and Institutions; Islamic Studies; History of Religion. The candidate may select a program with thesis (15 units of course work, including six units of thesis) or without thesis (15 units of course work, in addition to comprehensives and major essay). A competent reading knowledge of the appropriate languages must be acquired before writing the thesis or comprehensives and major essay.

The Department also offers studies leading to the Ph.D. degree in the field of Buddhist Studies.

Further information regarding both the M.A. and the Ph.D. programs is available on application to the Department. Brochures describing the programs in more detail are also available on request.

REMOTE SENSING COUNCIL — Graduate Programs with Specialty in Remote Sensing

P. A. Murtha, Chairman (Forestry and Soil Science); Wm. Emery (Oceanography); W. S. Havens (Computer Science); J. Hay (Geography); M. Ito (Electrical Engineering); A. K. Mackworth (Computer Science); N. Nathan (Civil Engineering); H. Schreier (Soil Science); G. Walker (Geophysics and Astronomy); R. J. Woodham (Forestry and Computer Science).

Studies in various aspects of remote sensing leading to either Master's or Ph.D. degrees in Forestry, Civil Engineering, Computer Science, Electrical Engineering, Geography, Geophysics and Astronomy, Oceanography or Soil Science are coordinated by the Council on Remote Sensing.

Students enter the program by admission as a Master's or Ph.D. candidate in one of the above. The discipline department and the student's committee chairman are selected from the Department or Faculty which represents the student's primary field of interest. Students are encouraged to seek representation on their committee from other University departments. In consultation with their committee, specialized programs of study can be developed for highly motivated and well qualified individuals in any aspect of remote sensing, or in any application of remote sensing technology. Similarly, specialized research programs can be developed to suit a student's interest-area and can range from theoretical development of remote sensing technology (including image analysis and sensor development) to specialized application of remote sensing (including vegetation and land classification, land use analysis, and oceanographic studies).

Remote Sensing research facilities are housed in the various associated departments and include a wide range of modern equipment which is continually being updated. Scholarships, fellowships, and teaching and research assistantships are available for eight and twelve month periods.

Additional information on graduate studies in remote sensing can be obtained directly from the Faculty of Graduate Studies or from the Chairman of the Council on Remote Sensing. Answers to more specific questions on research direction in the various disciplines relative to remote sensing may be obtained directly from the departments and individual Faculty members concerned.

Undergraduate and graduate courses in the field of Remote Sensing are offered in Astronomy, Civil Engineering, Computer Science, Electrical Engineering, Forestry, Geography, Geological Sciences, Oceanography, and Soil Science.

RESOURCE MANAGEMENT SCIENCE — Graduate Programs in Renewable Resource Management.

L. M. Lavkulich (Chairman), A. D. Chambers, P. Bradley, J. D. Chapman, P. N. Nemetz, P. H. Pearse, A. R. Thompson, B. Wiesman.

Studies leading to both Master's and Ph.D. degrees in various aspects of renewable resource management are available in Agricultural Sciences, Applied Science, Biology, Botany, Commerce and Business Administration, Community and Regional Planning, Economics, Forestry, Geography, Animal Resource Ecology, Applied Mathematics and Statistics, Oceanography and Zoology. Some of these programs emphasize a thorough understanding of the physical, biological, or economic aspects of resource systems. Others concentrate on the decision-making process or on techniques for analysing the institutional and the ecological implications of alternative resource-development goals. Examples of the former programs can be found within departments such as Zoology or Soil Science, while examples of the latter may be found within the Department of Economics and the Institute of Animal Resource Ecology.

To understand and deal with many of the problems that presently confront resource managers and resource scientists, a breadth of knowledge is required that is unprecedented in the history of resource husbandry. As a result, the demand for broad programs of study that can help students to develop an understanding of the biophysical, social, and economic dimensions of our use of renewable resources has increased. In response to this demand, the Faculty of Graduate Studies has established the Resource Management Science Committee to advise interdisciplinary students of options in renewable resource management, to co-ordinate and supervise their programs and, when necessary, to initiate graduate teaching and research in this general area of learning.

Since students entering this interdisciplinary area are expected to come from diverse backgrounds, individual programs of study can be designed to take previous training and interest into account. Courses are most frequently drawn from Animal Science, Anthropology and Sociology, Biology, Botany, Commerce and Business Administration, Community and Regional Planning, Economics, Engineering, Forestry, Geography, Law, Mathematics, Oceanography, Plant Science, Soil Science, and Zoology. In addition, interdisciplinary students in renewable resource management are expected to register for one or more workshop courses in which views of several disciplines are synthesized and applied to solve especially complex problems; e.g., Community and Regional Planning 531 (Introduction to Regional Planning and Management of Natural Resources), Resource Ecology 500 (Resource Science Workshop).

Students interested in undertaking disciplinary or interdisciplinary programs of study in wildlife, fisheries, land, forest-land or range management, or in recreation, resource policy, or other aspects of renewable resource management will find some programs listed in the appropriate sections of the Calendar. In addition, however, they should write to the Dean of the Faculty of Graduate Studies for more detailed information on developing programs in these areas.

SCIENCE, TECHNOLOGY AND SOCIETY STUDIES

Coordinator: E. Levy (Philosophy)

The many issues raised by the relations among science, technology, and the larger social context requires combinations of knowledge and expertise not readily available in any single discipline. The Committee on Science, Technology, and Society (STS) Studies has been established to support and encourage research and teaching in this important field.

Some examples of issues in the STS area are the development of science and technology and capacity to adjust the roles and ethical responsibilities of scientists and technologists; and the relations among science, technology, and other social institutions.

The STS Committee advises students of options in the field of study, may coordinate and supervise their programs, and, when appropriate, initiate graduate instruction. Although most students will pursue their studies within disciplinary departments, the STS Committee is prepared to advise and supervise students in "Interdisciplinary Studies" when appropriate.

Programs of study leading to Master's and Ph.D. degrees in various aspects of STS are available in a number of Faculties and Departments. Among these are: foundational studies in History, Philosophy, or Sociology; cross-cultural studies of science and technology (as in Anthropology or Asian Studies); Science and Technology Policy Studies (as in Political Science, Economics, International Relations, Community & Regional Planning, or Commerce and Business Administration).

Students wishing to specialize or study in STS should contact the Coordinator for lists of relevant courses, research projects, and faculty members.

SLAVONIC STUDIES—Ph.D. and M.A. degrees

Professor and Head: Bogdan Czaykowski.

Professor: Michael H. Futrell.

Associate Professors: Barbara Heldt, Peter Petro, Nicholas Poppe, Christopher J. G. Turner.

Assistant Professor: Irina M. Reid.

Instructors: Aram H. Ohanjanian, Irina Rebrin.

The Ph.D. degree is offered in the fields of Russian and Polish literature, and the M.A. degree in Russian language, literature and linguistics, and in Polish literature. Facilities are also provided for training in area studies. Library holdings have been described in official reports as being among the best in Canada. Comparative studies in literature can be undertaken in conjunction with the Comparative Literature Program, and studies in linguistics with the Department of Linguistics.

SOCIAL WORK—M.S.W. degree

Professor and Director: Glenn Drover.

Professors: John Crane, Richard Nann.

Associate Professors: Kloh-Ann Amacher, Ben Chud, David Freeman, Anne Furness, Dennis Guest, Jack MacDonald, Christiane McNiven, Mary Russell, Elaine Stolar.

Assistant Professors: Miles Buckman, Roop Seebaran, Mary Tadych.

The M.S.W. program offers a choice of three concentrations, in Family Needs, Health Needs or Socio-Economic Needs. The program involves 18 units of course work as follows:

(a) Three concentration specific courses, namely a two-term social welfare problems course (3 units), a two-term social work research course (3 units), and a two-term social policy and program planning course (3 units).
(b) A methodology/practice specialization (6 units) consisting of:
—A methodology/practice course(s) (3 units).
—Directed Field Studies or a Thesis (3 units).
(c) Elective courses in social work or in another discipline(s), approved by the candidate's program committee (3 units).

General admission requirements include a B.S.W. degree, or an equivalent undergraduate degree in Social Work.

A brochure is available from the School of Social Work which provides more specific information on the M.S.W. program, including admission requirements and procedures, the subject matter of the three concentrations, course and degree requirements, and the methodology/practice specializations.

Completion of the program normally requires a minimum of 10 months of full-time studies, beginning in September. Part-time study consisting of a minimum of six units per year is also possible.

SOCIOLOGY—Ph.D. and M.A. degrees

Professor and Head (Anthropology and Sociology): Martin G. Silverman.

Professors: Yunshik Chang, Werner Cohn, M. Patricia Marchak, Martin Meissner, Roy Turner.

Associate Professors: Tissa Fernando, Martha Foschi, Graham Johnson, John McMullan, Adrian Marriage, Robert Ratner, David Schweitzer.

Assistant Professors: George Gray, Neil Guppy, Blanca Muratorio-Posse, Kenneth Stoddart.

Senior Instructors: Ricardo Muratorio-Posse, John O'Connor.
(See also Anthropology listing)

Studies in the M.A. and Ph.D. programs in Sociology normally are available in the following areas of study:

1. Sociological Theory
2. Research Methods
3. Community Studies & Demography
4. Deviance & Social Control
5. Social Change & Development
6. Social Inequality
7. Social Interaction
8. Sociology of Knowledge
9. Work & Industry
10. Canadian Society
11. Political Sociology

The M.A. program which is available to both full-time and part-time students, requires a thesis and courses which include sociological theory and research methods. The prerequisite for the Ph.D. program normally is a Master's degree in Sociology, which includes preparation in sociological theory and in research methods. M.A. candidates may be transferred to the Ph.D. program after the first year of graduate work has been completed. The Ph.D. program includes courses, comprehensive examinations, and a dissertation.

Research facilities in sociology include social survey, small groups, and ethnomethodology-sociolinguistic laboratories. The Department also has laboratories for ethnography, archaeology, and physical anthropology, a museum, and computing and calculating resources. Also available are the University Computing Centre, Arts Computing for statistical and programming assistance, and the Data Library for data archives.

More detailed information can be requested from the Department's Admissions Officer.

SOIL SCIENCE—Ph.D. and M.Sc. degrees

Professor and Head: Leslie M. Lavkulich.

Professors: Timothy M. Ballard, T. Andrew Black, Lawrence E. Lowe, Peter A. Murtha.

Associate Professor: Jan de Vries.

Assistant Professors: Arthur A. Bomke, Michael D. Novak, Hanspeter E. Schreier.

NSERC-University Research Fellow: Shannon M. Berch.

The Department offers opportunities for advanced study in the fields of Soil Chemistry and Mineralogy, Soil Organic Matter, Soil Physics, Biometeorology, Soil Pollution, Soil and Water Conservation, Soil Genesis and Classification, Land Use and Land Classification, Forest Soils, Soil Fertility, Soil Biology, and Remote Sensing. The Department's laboratories are well-equipped for research in these fields and access is available to major equipment installations in other Departments. Excellent library facilities are available in Soil Science and related fields. The Province of British Columbia is an unexcelled outdoor laboratory for the study of soils and the Department's close association with the Canada Soil Survey, British Columbia, Ministry of the Environment, Lands Directorate, and related programs facilitates taking advantage of this for advanced study. The University Research Forest at Haney operated by the Faculty of Forestry is also available for Soil Research.

Prerequisite for M.Sc.: A Bachelor's degree, with acceptable courses in fields of study related to Soil Science. Applicants, otherwise acceptable, who do not have 6 units of approved courses in Soil Science, may take them concurrently with the Master's program.

SPANISH—Ph.D. and M.A. degree. (see Hispanic and Italian Studies)

STATISTICS—Ph.D. and M.Sc. degrees

Professor and Head: J. V. Zidek

Professor: A. W. Marshall

Associate Professors: F. P. Glick, A. J. Petkau, N. M. Reid, M. Schulzer

Assistant Professors: N. E. Heckman, H. Joe.

Associate Members: P. De Jong (Commerce), P. E. Greenwood (Mathematics), D. Ludwig (Mathematics/Institute of Animal Resource Ecology), M. L. Puterman (Commerce), W. J. Welch (Commerce).

The program leading to the degree of Master of Science is designed to prepare the student for employment in government and industry or to serve as preparation for students planning to undertake a program leading to the Ph.D. degree. The studies leading to the degree of Doctor of Philosophy are designed to equip the student to carry out research, with a view toward a career in academia, industry or government. Research interests of the faculty include nonparametric methods, survival analysis, reliability theory, statistical decision theory, optimal estimation, sequential methods, biostatistics, classification and discrimination, inequalities, multivariate distribution theory, extreme value theory, optimal design of clinical trials, and Bayesian statistics. Students should consult the brochures, available from the Department, containing descriptions of courses and of programs as well as information on financial aid and application forms.

SURGERY—M.Sc. degree

Head: A. D. Forward

Director, M.Sc. Program: Andrew Seal.

Professors: W. B. Chung (Vascular), P. J. Doyle (ORL), R. C. Harrison (General Surgery), M. G. McLoughlin (Urology), J. K. MacFarlane (General Surgery), G. F. O. Tyers (Cardiovascular and Thoracic).

Associate Professors: D. B. Allardyce, I. G. M. Cleator (General Surgery), F. A. Durity (Neurosurgery), A. D. Forward (General Surgery), P. J. Moloney (Utorlogy), M. D. Morrison (ORL), D. W. F. Schwarz (Otorhinolaryngology), C. F. T. Snelling (Plastic Surgery), I. M. Turnbull (Neurosurgery).

Assistant Professors: A. Seal (General Surgery), C. H. Scudamore (General Surgery), J. Vestrup (General Surgery).

Clinical Professors: P. G. Ashmore (Paediatric Surgery) A. D. Courtemanche (Plastic).

The Department of Surgery offers opportunities and facilities for full-time study leading to the degree of M.Sc. in Surgery. Applicants must satisfy the normal admission requirements of the Faculty of Graduate Studies and must be acceptable to the Department of Surgery's Graduate Studies Committee. Prerequisites for application are: M.D., M.B., D.M.D., D.V.M. or equivalent. A candidate's program will be determined by the program director in consultation with the candidate's supervisor. A supervisory committee will be chosen to represent the area of specialization elected by the candidate. The M.Sc. Program consists of a 3, 6 or 9 unit thesis (SURG 549) plus 12, 9 or 6 units of course work to give a total of 15 units. Six units of course work must be at the 500 level, of which 4 units should be from the Department of Surgery courses 502-548. For descriptions of these courses see Surgery under "Courses of Instruction" section of the Calendar. The candidate, with the advice of the committee, may select other approved courses in related fields. Further information may be obtained from the M.Sc. Program Director, Department of Surgery.

THEATRE—Ph.D., M.A. and M.F.A. degrees

Associate Professor and Head: John Brockington.

Professor: Errol Durbach, A. J. Reynertson.

Associate Professors: Brian Jackson, Peter Loeffler, Klaus G. Strassman, Arne Zaslove.

Assistant Professors: Don Davis, Ray Hall, John Newton, Charles Siegel, Stanley A. Weese, M. Norman Young.

The Department offers opportunities for advanced studies leading to the M.A. and Ph.D. degrees in Dramatic Literature, Theatre History and Criticism. The Masters program in Playwriting is offered in cooperation with the Department of Creative Writing.

The Department also offers advanced studies leading to the M.F.A. degree in the Direction of Plays and Production, and in the Design of Scenery and Costume.

In the Film/Television Studies Program, the M.A. degree is offered in history/theory/criticism and the M.F.A. in production. Each is a two-year course of studies and requires, as a prerequisite, an undergraduate degree in film/television studies or the equivalent.

The Department of Theatre has a diversified program in both practical theatre and the academic study of dramatic literature, history and criticism. Regular productions, directed by faculty and by graduate students, are presented in the Frederic Wood Theatre and in the Dorothy Somerset Studio. There is opportunity for participation in all aspects of production.

Library resources are constantly expanding from the present collection of approximately 30,000 works of dramatic literature and books on theatre, and more than 70 periodicals. There are almost 500 recordings of drama in the Wilson Library.

The library also has an extensive holding of film/television studies literature, and the department has a generous pool of equipment as well as a small library of films for bench examination.

Further information about graduate programs can be obtained from the Department's Graduate Handbook.

CENTRE FOR TRANSPORTATION STUDIES

Director: Trevor D. Heaver, UPS Foundation Professor and Director.

The Centre encourages transport research, supports students majoring in transportation, and sponsors a variety of seminars, symposia and other programs. It brings distinguished visitors to the campus for short programs, for an academic term, or for a year.

The Centre encourages research in a variety of areas, both academic and problem-centred. Some of its research deals with specific transport modes, business-government relations, regulation, socio-economic problems and transport planning together with its many ramifications. Much of the research is inter-disciplinary. Some research projects are sponsored by the provincial government, the federal government or other government agencies. These projects generally afford graduate students opportunities to do research work which is significant to Canada or to the world economy.

Transportation courses are offered in several university departments and professional schools including Commerce and Business Administration, Community and Regional Planning, Civil Engineering, Economics, and Geography. Students interested in working towards degrees should enrol in one of these departments.

There is an active demand for well-qualified graduates who have majored in transport. The Centre cooperates with prospective employers and with the University Placement Service in placing UBC graduates.

URBAN STUDIES

Chairman: D. Ley (Geography)

Urban studies are the concern of many university departments and professional schools:

Architecture, Community and Regional Planning, Civil Engineering (Transportation), Commerce and Business Administration (Land Economics), Geography, History, Political Science, and Sociology, but this list is not exhaustive.

Students interested in a *Master's Degree* should enrol in any one of these departments, and make arrangements for courses and faculty representation on their research committee from other University departments. These arrangements are made through the department in which the student is enrolled, but the Chairman of the Graduate Sub-committee on Urban Studies will provide initial advice and direction, if requested. Students with very high academic standing and a clear research objective may be admitted to an interdisciplinary program.

At the *Ph.D.* level, an interdisciplinary program in Urban Studies is offered. This requires the commitment of a faculty member to serve as chairman of the student's committee. That faculty member will then assist the student in forming a suitable committee of faculty from other departments. The Chairman of the Graduate Sub-committee on Urban Studies assists in making these arrangements.

Students interested in Urban Studies should write to the Chairman of Graduate Urban Studies in the Office of the Dean of Graduate Studies for further advice and guidance. To receive serious consideration, the prospective student's proposed research should be outlined as fully as possible. A list of relevant courses will be provided on request.

THE WESTWATER RESEARCH CENTRE

Director: Andrew R. Thompson (Law).

Assistant Directors: Anthony H. J. Dorcey (Community and Regional Planning), Kenneth J. Hall (Civil Engineering).

The Westwater Research Centre was established during the spring of 1971. The Centre is funded by university support of the core staff and research funds from various federal and provincial government agencies, private foundations and industry. The function of the Centre is to conduct interdisciplinary research on problems concerning water resources and their associated lands. Its general objective is to provide an improved foundation for decisions about policies and institutional arrangements through rigorous analysis of the alternative courses of action that might be taken. The research program involves physical, biological and social scientists in the analysis of multi-dimensional problems. Students are associated with the Centre by working with a faculty member who is engaged in a Centre project.

ZOOLOGY—Ph.D. and M.Sc. degree

Professor and Head: G. G. E. Scudder.

Professors: A. B. Acton, C. V. Finnegan, H. D. Fisher, P. W. Hochachka, C. S. Holling, D. G. Holm, D. R. Jones, C. J. Krebs, P. A. Larkin, A. G. Lewis, N. R. Liley, C. C. Lindsey, J. D. McPhail, T. R. Parsons, A. M. Perks, J. E. Phillips, D. J. Randall, H. F. Stich, D. T. Suzuki, C. J. Walters, N. J. Wilimovsky.

Associate Professors: J. D. Berger, R. W. Blake, D. R. Brooks, T. H. Carefoot, C. L. Gass, J. M. Gosline, T. A. Grigliatti, H. E. Kasinsky, W. K. Milson, W. E. Neill, H. C. Nordan, A. R. E. Sinclair, J. N. M. Smith, J. D. Steeves, C. F. Wehrhahn.

Assistant Professors: H. W. Brock, M. Jackson.

Associate Members: N. Auersperg, J. Myers, T. G. Northcote, W. G. Wellington.

Research work falls into four broad categories with a healthy overlap of interest and interaction among the different groups. In addition, there are several programs of a special or interdisciplinary nature in which the Department of Zoology participates actively with other departments and faculties. Following is a brief summary of the varied investigations and facilities for research.

Cell and Developmental Biology—Several groups of workers in this area, which includes GENETICS, are independently investigating problems in a number of different fields of cell biology. The following are the major topics currently under active study: Genetics and cell biology of ciliates; cytogenetics of *Chironomus* and man and other mammals; the role of nuclear proteins in early development; genetics and biochemistry of determination and pattern formation in early development in insects and amphibians; gene organization packaging, and regulation of expression in *Drosophila;* genetic and biochemical analysis of gene expression during development in *Drosophila*, amphibians and fish; messenger RNA transcription and translation; the genetics of recombination, development, and the meiotic properties of compound autosomes in *Drosophila melanogaster;* molecular evolution in vertebrates; the genetics of aging. Equipment includes: fluorescence microscope (Zeiss); UV-microspectrophotometer (Zeiss); UV/visible scanning spectrophotometers; DNA cloning and sequencing apparatus; Amino acid analyzer; ultracentrifuge (Spinco); electron microscopes (Cambridge Stereoscan, Hitachi HS7S, Philips 75, Zeiss EM10); ultramicrotomes (Porter-Blum, LKB, Reichert); cryostat; tissue culture and electrophoresis apparatus. Saltwater and freshwater aquaria, a vivarium and radioisotope handling facilities (liquid scintillation counter, automatic planchette counter) are available.

Community and Population Biology—This group is investigating the principles of theoretical and applied ecology and population genetics as they relate to specific ecological systems. The total program involves field and laboratory experimentation, mathematical modelling, simulation and analysis. Several natural areas are available for field work and the laboratories offer a wide range of facilities for experimentation and observation. New techniques of systems analysis are facilitated through a computing centre containing an analogue and a digital computer, optical and graphical displays, and automated field and laboratory data acquisition systems. A systems mathematician, computer analyst, and programmers assist with the planning of research and analysis of data.

Research programs include: community structure and productivity of a fresh water lake; optimum yield and simulation models of fish populations; genetic variability within mammal, insect, fresh water invertebrate and plant populations; effects of predation on behaviour and genetics of fish populations; population dynamics of zooplankton, fish, insects, birds and mammals; experimental analysis and mathematical models of predation, competition and dispersal; effects of predation and competition on aquatic invertebrates; ecology of hummingbirds; a systems approach to human ecology; ecology of large mammals.

Comparative Physiology and Biochemistry—Equipment required for most kinds of sophisticated physiological and biochemical work is available in several laboratories. This includes analogue recording systems, both direct writing and magnetic tape; blood gas equipment including gas chromatographs; pressure and flow metering systems; respirometers for aquatic and terrestrial animals; amino-acid and auto-analyzers; atomic absorption and emission spectra photometers; electrofocussing columns; telemetry equipment and all associated peripherals. Special laboratories are provided for neurophysiological research and for experiments involving the use of radioisotopes. Animal holding facilities include controlled environment rooms, several aquarium rooms, a vivarium and an exterior fish holding facility. Problems currently under active investigation include: comparative studies of circulatory and respiratory dynamics; physiology of diving animals; hydrodynamics, kinematics and energetics of swimming; water, salt and energy balance in marine birds; aspects of fish respiration; comparative studies on the control of breathing in birds and reptiles; environmental physiology of marine invertebrates (particularly osmotic and ionic regulation); membrane transport processes and physiology of excretion in insects; biomaterials science; enzyme systems in poikilotherms; central nervous control of locomotion in invertebrates and vertebrates; central nervous development; neurohypophysial hormones of different vertebrates and mammalian embryos; comparative studies of plasma kinins, and their importance in mammalian reproduction; endocrinology of the foetus, and hormonal control of foetal membranes; reproductive endocrinology and behaviour of fishes; functional anatomy of marine mammals; bioenergetics and growth of mammals—particularly the game species.

Evolutionary Biology—A broad spectrum of research, loosely grouped under this heading, is being pursued by faculty and graduate students in various areas of both vertebrate and invertebrate zoology. Facilities include several excellent museums, a vivarium and aquarium, field equipment including vehicles and rooms for animal culture, experimentation and observation. Problems currently under investigation include: phylogenetic reconstruction and pattern analysis in the evolution of helminth/host systems; co-existence and competitive exclusion in aquatic insects; cardiac glycosides in insects and aposematic coloration; studies of functional morphology and evolution of insect structure; zoogeography of insects in British Columbia and the systematics of the Lygaeidae of the world; distribution of marine plankton in relation to physical and chemical oceanography; systematics and zoogeography of fishes—particularly of the North Pacific and Arctic; adaptive significance of meristic variation; structural design of animals; significance of natural variation in morphology and behaviour of fishes—particularly the guppy *Poecilia* and the stickleback *Gasterosteus*; prey selection in natural predators of the guppy; influence of environmental and hormonal factors on fish behaviour; role of predation on the origin and maintenance of isolation between genotypes (sticklebacks); reproductive biology of mammals; factors affecting reproductive output in wild populations; regulation of breeding activity in natural populations; evolution of mammals with special emphasis on speciation in both continental and island populations.

Special Programs—The Department of Zoology is actively involved in several interdisciplinary programs of instruction and research. Further details may be obtained by writing to the Director or Chairman of the program as indicated below:

Cancer Research—The Director, B.C. Cancer Research Centre.
Oceanography—S. E. Calvert, Head of the Department.
Resource Management Sciences—L. M. Lavkulich, Resource Management Science.
Fisheries—N. J. Wilimovsky, Institute of Animal Resource Ecology.
Wildlife Biology—C. J. Krebs, A. R. E. Sinclair, Department of Zoology.
Animal Resource Ecology—J. D. McPhail, Acting Director, IARE.

REGISTRATION IN THE FACULTY OF GRADUATE STUDIES, November 1985

Department	Degree	Total
Agricultural Economics	M.Sc.	12
Agricultural Extension	M.Sc.	2
Agricultural Mechanics	M.Sc.	8
Anatomy	M.Sc.	5
	Ph.D.	3
Animal Science	M.Sc.	13
	Ph.D.	4
Anthropology	M.A.	22
	Ph.D.	14
Architecture	M.Arch.	3
	M.A.S.A.	—
Asian Studies	M.A.	13
	Ph.D.	12
Audiology and Speech Sciences	M.Sc.	28
	Ph.D.	1
Biochemistry	M.Sc.	6
	Ph.D.	29
Biology	M.Sc.	1
	Ph.D.	1
Bio-Resource Engineering	M.A.Sc.	9
Botany	M.Sc.	18
	Ph.D.	18
Chemical Engineering	M.A.Sc.	20
	M.Eng.	14
	Ph.D.	17
Chemistry	M.Sc.	47
	Ph.D.	96
Civil Engineering	M.A.Sc.	61
	M.Eng.	26
	Ph.D.	41
Classics	M.A.	3
	Ph.D.	6
Clinical Engineering	M.Eng.	7
Commerce	M.B.A.	326
	M.Sc.	47
	Ph.D	66
Community and Regional Planning	M.A.	64
	M.Sc.	17
	Ph.D.	7
Comparative Literature	M.A.	7
	Ph.D.	6
Computer Science	M.Sc.	35
	Ph.D.	19
Creative Writing	M.F.A.	37
Dentistry	M.Sc.	3
Economics	M.A.	17
	Ph.D.	31
Education	M.A.	292
	M.Ed.	445
	Ed.D.	113
	Ph.D.	15
Electrical Engineering	M.A.Sc.	57
	M.Eng.	3
	Ph.D.	26
English	M.A.	31
	Ph.D.	25
Family Studies	M.A.	5
Fine Arts	M.A.	19
	M.F.A.	9
	Ph.D.	2
Food Science	M.Sc.	20
	Ph.D.	6
Forestry	M.F.	13
	M.A.Sc.	1
	M.Sc.	38
	Ph.D.	38
French	M.A.	26
	Ph.D.	3
Genetics	M.Sc.	14
	Ph.D.	18
Geography	M.A.	16
	M.Sc.	7
	Ph.D.	22
Geological Engineering	Ph.D.	1
	M.Eng	—
	M.A.Sc.	2
Geology	M.Sc.	33
	Ph.D.	14
Geophysics and Astronomy	M.Sc.	16
	Ph.D.	18
Germanic Studies	M.A.	1
	Ph.D.	8
Health Sciences	M.H.Sc.	19
Health Services Planning	M.Sc.	42
Hispanic Studies	M.A.	1
	Ph.D.	5
History	M.A.	22
	Ph.D.	14
Human Nutrition	M.Sc.	5
	Ph.D.	—
Human Reproduction Biology		1
Interdisciplinary	M.A.	3
	M.Sc.	6
	Ph.D.	20
Law	LL.M.	20
Linguistics	M.A.	3
	Ph.D.	6
Mathematics	M.A.	1
	M.Sc.	12
	Ph.D.	14
Mechanical Engineering	M.A.Sc.	31
	M.Eng.	3
	Ph.D.	17
Metallurgical Engineering	M.A.Sc.	20
	Ph.D.	17
	M.Eng.	—
Metallurgy	M.Sc.	—
	Ph.D.	2
Microbiology	M.Sc.	15
	Ph.D.	34
Mining and Mineral Process Engineering	M.Eng.	6
	M.A.Sc.	14
	Ph.D	7
Music	M.A.	5
	M.Mus.	16
	Ph.D.	10
	D.M.A.	11
Neurological Sciences	M.Sc.	1
Neurosciences	M.Sc.	3
	Ph.D.	7
Nursing	M.S.N.	76
Oceanography	M.Sc.	19
	Ph.D.	20
Pathology	M.Sc.	26
	Ph.D.	19
Pharmaceutical Sciences	M.Sc.	20
	Ph.D.	13

Department	Degree	Total
Pharmacology and Therapeutics	M.Sc.	6
	Ph.D.	6
Philosophy	M.A.	9
	Ph.D.	9
Physical Education	M.P.E.	60
Physics	M.Sc.	38
	M.A.Sc.	6
	Ph.D.	54
Physiology	M.Sc.	10
	Ph.D.	12
Plant Science	M.Sc.	24
	Ph.D.	13
Political Science	M.A.	26
	Ph.D.	14
Poultry Science	M.Sc.	3
	Ph.D.	2
Psychology	M.A.	40
	Ph.D.	32
Psychiatry	M.Sc.	2
Religious Studies	M.A.	7
	Ph.D.	—
Slavonic Studies	M.A.	1
	Ph.D.	3
Sociology	M.A.	14
	Ph.D.	12
Social Work	M.S.W.	61
Soil Science	M.Sc.	15
	Ph.D.	13
Statistics	M.Sc.	9
	Ph.D.	2
Surgery	M.Sc.	—
Theatre	M.A.	7
	M.F.A.	14
	Ph.D.	2
Zoology	M.Sc.	56
	Ph.D.	69
	Total	3,856

1986-87

THE FACULTY OF LAW

ACADEMIC STAFF

P. T. BURNS, Q.C., LL.B., LL.M. (Otago), Professor and Dean of the Faculty.
J. M. MacINTYRE, B.Com., LL.B. (Brit. Col.), LL.M. (Harvard), Professor and Associate Dean.
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D. L. GUTH, B.A. (Marquette, Milwaukee) (Cantab.), M.A. (Creighton, Omaha), Ph.D. (Pittsburgh), Visiting Associate Professor.
P. CARTER, M.A., B.C.L. (Oxon), 1986 Visiting Walter S. Owen Professor.
M. K. KUWAHARA, B.A., LL.B. (Kyoto), J.S.D. (Kobe), Visiting Professor.
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S. STEVENS, LL.B. (Brit. Col.), Instructor I, Director, Native Law Student Program.
WEI-YUN XIAO, Ph.D. (Leningrad), Visiting Professor.
DUXIAN YANG, Visiting Professor.

Adjunct Professors

J. R. ALDRIDGE, B.A. (Brock), LL.B. (Osgoode), LL.M. (Brit. Col.), Immigration.
M. J. ALLAN, B.A., LL.B. (Brit. Col.), M.A. (Alberta), Civil Litigation.
H. C. ALVAREZ, B.A. (Brit Col.), LL.B. (Ottawa), International Commercial Arbitration.
G. T. W. BOWDEN, B.A., LL.B. (Brit Col.), Taxation I.
C. O. D. BRANSON, Q.C., LL.B. (Brit. Col.), Trial Advocacy.
D. L. BROWNING, LL.B. (Brit Col.), Close Corporations.
G. E. H. CADMAN, LL.B. (Osgoode), Real Estate Transactions.
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R. GATHERCOLE, B.A. (Queen's), LL.B. (Tor.), LL.M. (Lond.), Communications.
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B. M. GREEN, B.Sc. (Princeton), M.A. (W. Ont.), LL.B. (Osgoode), Industrial and Intellectual Property.
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C. E. HINKSON, LL.B. (Brit. Col.), Trial Advocacy.
R. H. HOLLOWAY, B.A., LL.B. (Brit. Col.), Trial Advocacy.
J. L. JESSIMAN, B.A., LL.B. LL.M. (Brit. Col.), LL.D. (Victoria & Trinity), Maritime Law.
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His Honour Judge H. J. McGIVERN, LL.B. (Brit. Col.), Trial Advocacy and Clinical Criminal Law.
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C. D. MUTALA, LL.B. (Manitoba), LL.M. (New York), Industrial and Intellectual Property.
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O. HANS NOWAK, B.Com., LL.B. (Brit Col.), Taxation I.
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B. F. RALPH, B.A. (Victoria), LL.B. (Brit. Col.), LL.M. (London).
A. REES-THOMAS, LL.B. (Wellington), Topics, Procedure & Evidence.
J. REYNOLDS, LL.B., Ph.D. (London), Secured Transactions.
D. W. ROBERTS, B.A., LL.B. (Brit. Col.), LL.M., S.J.D. (Mich.), Evidence.
L. SALTER, B.A. (Toronto), M.A. (Simon Fraser), Regulation of Communications.
G. R. SCHMITT, Q.C., B.A., LL.B. (Sask.), LL.M. (Harvard), Professional Responsibility.

P.S. SHANDRO, B.A. (Alta.), M.A. (McGill), B.C.L., M.A. (Oxon), Topics in Commercial Law.
M. K. SINGLETON, B.A. (Yale), M.A., Ph.D. (Duke), J.D. (Berkeley), Family Law.
K. J. SMITH, B.A., LL.B. (Brit. Col.), Trial Advocacy.
D. J. SOROCHAN, B.A. (Alta.), LL.B. (Brit. Col.), Trial Advocacy.
W. T. STANBURY, B.Com. (Brit. Col.), M.A., Ph.D. (Berkeley), Competition Policy.
R. C. STROTHER, B.A. (Calgary), LL.B. (Dalhousie), LL.M. (Harvard), Tax I.
A. R. SZIBBO, B.A. (Waterloo), LL.B. (Brit Col.), Technology & the Law.
A. C. THACKRAY, Q.C., B.Com., LL.B. (Brit. Col.), Trial Advocacy.
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B. L. WIGGS, B.Sc., LL.B. (Brit Col.), Industrial & Intellectual Property.
H. C. WOOD, B.A., LL.B. (Osgoode), Trial Advocacy.
R. E. YOUNG, M.A., LL.B. (Brit. Col.), Real Estate Development.
D. W. YULE, B.A. (Brit. Col.), LL.B. (Queen's), Insurance.
J. ZISKROUT, B.A., LL.B. (Brit. Col.), Professional Responsibility and Trial Advocacy.

Librarians
M. E. MITCHELL, B.A. (Carleton), M.L.S. (Brit. Col.), Librarian.
T. J. SHORTHOUSE, B.A., B.L.S. (Brit. Col.), Head Librarian.
A. H. SOROKA, B.A. (Columbia), LL.B. (Virginia), M.L.S. (Columbia), Librarian.

FACULTY OF LAW

General

The Faculty of Law was established in 1945 in temporary accommodation. A permanent structure, opened in 1951, has been incorporated in an enlarged, remodelled George F. Curtis Building which was completed in 1976. It contains a library of approximately 150,000 volumes, one of the finest law libraries in Canada. The library consists of substantially all the Canadian and English materials, the major United States reports, wide holdings of Commonwealth, United States and other foreign texts and periodicals, and a substantial collection of International Law materials. The University is also a repository for United Nations publications.

Degrees

The Faculty of Law offers two degrees, Bachelor of Laws (LL.B.) and Master of Laws (LL.M.). Information concerning the LL.M. degree may be found in the Graduate Studies section of the Calendar. The Bachelor of Laws degree is granted on the successful completion of a three-year course, and prepares students for admission to the practice of law (subject to further requirements which are set out below) and for business and public service. Studies leading to the bachelor's degree are not at present offered on a part-time basis. The number of students entering the practice of law in Canada has increased in the last few years to a large extent and a degree in law is no guarantee of a position in either the necessary year of articles (described below) or in the practice of law.

The Degree of LL.B. combined with the Degree of M.B.A.

The Faculty of Law and the Faculty of Graduate Studies offer a combined program leading to the degrees of Bachelor of Laws (LL.B.) and Master of Business Administration (M.B.A.). Details of this combined program are set out in the Faculty of Graduate Studies section of this calendar.

Bachelor of Laws — LL.B.

Admission: (i) Application

All applicants for entry to the first year of legal studies at the Faculty of Law must make formal application to the Registrar of the University not later than December 31 of the year preceding the year of entry. An applicant must obtain an application form from the Office of the Registrar and submit it before or on that date whether or not transcripts of previous academic studies are then available. **Late applications will not be considered.**

All applicants for admission to the Faculty of Law are required to write the Law School Admission Test and have their score forwarded to the Faculty of Law before their application for admission will be considered. The L.S.A.T. is a uniform general admission test which is designed to evaluate capacities for analysis and expression and to assist the Faculty in considering the merits of students who apply, as they now do, with widely varying academic backgrounds. The L.S.A.T. score will be used in combination with the other information required to be supplied by applicants. The test is administered in many locations in Canada and the United States including the University of British Columbia. **Applicants must arrange to write the L.S.A.T. prior to the December 31 deadline.** Therefore, they are advised to act immediately and should apply to the Student Counselling and Resources Centre, Brock Hall, 1874 East Mall, The University of British Columbia, Vancouver B.C. V6T 1W5 or Law School Admission Services, Box 2000, Newtown, PA, 18940, U.S.A. Applicants must submit an L.S.A.T. score from a test written since June 1982. An L.S.A.T. score from a test written prior to that date will rank the scores from 200 to 800 and will not be accepted. In order for the law school to receive an applicant's L.S.A.T. score, applicants must ensure that their L.S.A.T. matching card is attached to the law application form at the time of applying.

Enrolment in the Faculty is limited to a total of 700 students in the three years. In any given academic year numbers may be limited if the Faculty's resources and facilities are not capable of accommodating 700 students. (See General University Regulations, below.) Applicants should therefore regard the satisfying of the entrance requirements as meaning only that they are eligible for selection, and that such selection shall be solely within the discretion of the Faculty of Law.

A fee is charged for evaluating educational documents issued by institutions not in British Columbia. The fee must accompany the application for admission form when submitted with supporting documents. The fee is non-refundable and is not applied to tuition.

(ii) Academic Requirements

In order to be eligible for consideration for admission to the Faculty, applicants must present evidence of having, at the time of application:

(a) graduated in an approved course of studies from The University of British Columbia and obtained an overall standing of not less than 65%, or obtained the equivalent at an approved university; or
(b) successfully completed the first three years (45 units of credit) or more of an approved course of studies leading to a degree at The University of British Columbia and obtained an overall standing of not less than 65%, or completed the equivalent at an approved university; or
(c) successfully completed the first two years of an approved course of studies leading to a degree at The University of British Columbia and obtained an overall standing of not less than 65%, or obtained the equivalent at an approved College or University, and having enrolled in the third year of the degree program. An offer of admission to an applicant in this category is conditional on successful completion of such third year for a total of 45 units of credit at the University of British Columbia, or the equivalent, and maintaining an overall standing of not less than 65% or the equivalent.

(iii) Discretionary Applicants

The Faculty may admit persons who lack the foregoing requirements. Persons who consider that their circumstances are sufficiently exceptional or unusual may apply as discretionary applicants. Applicants under this category **must** be B.C. residents.

(a) It should be clearly understood that this discretionary category is **not** intended to serve as an alternative available to the **ordinary** applicant. Nevertheless the Faculty does consider every discretionary application on its merits.
(b) **The admission of a discretionary applicant is solely within the discretion of the Faculty.** Decisions in respect of these applications will usually not be made until summer, when all such applications can be considered together. Since places in the Faculty are limited, and since admissions under the discretionary category may result in other qualified applicants not being accepted, only exceptional applicants will be considered under this category.
(c) Persons who wish their applications to be considered within this discretionary category must **provide, with their application form** and L.S.A.T. score, a biographical resume setting out the special circumstances they wish to have considered in evaluating their application. Supporting documentation should be included wherever possible (e.g. medical reports or letters of reference).
(d) Examples of the factors to be taken into account in considering discretionary applicants are age, physical disabilities, economically deprived circumstances, career experience, special achievements, and involvement in community affairs. An applicant's entire resume, supporting documentation and academic record will be reviewed. It is the policy of the Faculty to require **a minimum of two years of undergraduate studies** by an applicant in this category. An applicant's L.S.A.T. score will also be a factor in determining selection in this category. It is the responsiblity of an applicant to ensure that his or her application is complete and fully documented as the Faculty cannot conduct interviews of discretionary candidates.
(e) Native applicants may apply for admission under the discretionary category. A special native law program has been instituted by the Faculty, and interested applicants should direct inquiries as early as possible to the Director, Native Law Program, Faculty of Law. Native applicants may be required to attend the two month prelaw summer program for native law students offered by the University of Saskatchewan. The general policy is to require a minimum of two years of undergraduate studies before entry into the LL.B. program; however, the Faculty considers the applicant's background, experience, undergraduate record, L.S.A.T. score, and performance in the Saskatchewan summer program.

(iv) Advanced Standing and Unclassified

Graduates of foreign law schools may apply to the Faculty of Law for advanced standing or unclassified status. A candidate who in the opinion of the Faculty is deficient in English will be refused admission. The admission of a student with advanced standing or unclassified status is solely within the discretion of the Faculty. Decisions on these applications are usually not made until summer, when all such applications can be considered together.

(a) Advanced Standing

An applicant who is a graduate of a school of law from a foreign jurisdiction may apply for advanced standing in the Faculty. The policy of The University of British Columbia is that a student must complete a minimum of two years of studies at the University to qualify for an undergraduate degree. Therefore, an advanced standing student cannot obtain the LL.B. degree in only one year. An applicant for advanced standing may be required to write a test administered by the University to determine proficiency in English. An applicant for advanced standing must also submit an L.S.A.T. score. In considering a request for advanced standing the Faculty will consider the applicant's L.S.A.T. score, previous academic record, proficiency in English, and any other special circumstances that the candidate may wish to submit.

(b) Unclassified

An applicant who has a law degree or its equivalent from a foreign jurisdiction and who wishes to complete one year of legal studies at the Faculty in order to satisfy the certification requirements of the Joint Committee on Foreign Accreditation may apply for unclassified status. The applicant will not be granted the LL.B. degree. An applicant must satisfy the same admission requirements as are required for the advanced standing status.

(v) Transfer and Visiting (Letter of Permission)

Undergraduates of other Canadian law schools may apply to transfer to the Faculty on a transfer or letter of permission basis. Admission of a student on a transfer or visiting status is solely within the discretion of the Faculty, and because of the number of requests decisions are usually not made until the summer months preceding the academic year.

(a) Transfer

Students at other Canadian Law Schools who apply for permission to transfer into second year at the Faculty of Law should demonstrate to the Faculty (i) that they have achieved a satisfactory academic performance in their first year of legal studies, and (ii) that they have compelling reasons for transferring to The University of British Columbia. Preference will be given to requests based on compassionate grounds where the applicant has no control over the circumstances involved, and to applicants who would have been admitted to the Faculty for their first year of legal studies.

(b) Visiting (Letter of Permission)

Students at other Canadian Law Schools requesting permission to attend either the second or third year program at the Faculty of Law on a letter of permission basis from their present law school and who will be granted their LL.B. degree from that law school should demonstrate that they have achieved a satisfactory academic performance in their legal studies. If there are a number of such requests the Committee may give preference to the applicants with the best academic performance in their legal studies. Moreover, the Faculty may take into account compassionate grounds, and whether applicants would have been admitted to the Faculty for their first year of legal studies

(vi) Acknowledgement of acceptance

Within two weeks of being notified that their application has been accepted, applicants must (i) send a deposit of two hundred dollars ($200.00) (by cheque payable to The University of British Columbia), which will be applied to the tuition fees, (this deposit is refundable upon receipt by the Faculty of Law of written notification by the applicant of inability to attend, providing such notification is received no later than July 15) and (ii) submit to the Faculty of Law two recent passport photographs of themselves, endorsed with their names. Photographs should be approximately 1¼ inches by 1¾ inches, black and white (not coloured) and not the "instant" type.

Note: The deposit of two hundred dollars is payable **only** by those applicants who receive official notification of their admission to the Faculty of Law and should not be sent in with the initial application for admission.

Registration

Registration must be completed in person in the Curtis (Law) Building on the first day of lectures. For details of registration, please refer to the Administrative Assistant of the Faculty of Law. No student will be allowed to register after the first day of instruction in the term or admitted to any class after its first meeting, except by permission of the Dean after written application.

Examinations (i) *General*

Final examinations will be held at the close of each term in December and April except in respect of full year courses which will be examined in April. The examinations may be substituted or supplemented from time to time as may be deemed appropriate.

A student, in order to pass the year, must obtain an average of not less than 55 per cent in the work of that year. Candidates will be ranked in units of one for all those falling within the top 10% of the class. No other information as to rank will appear on the transcript.

Term essays and examination papers may be refused a passing mark if they are illegible or deficient in English.

A student who fails the year or withdraws or does not write one or more final examinations must, before July 2, make special application for readmission to the Faculty in order to repeat the year. All such applications will be dealt with on their own merits.

Where a student has withdrawn in the second term of the Second or Third Year of the program, and is granted readmission into Second or Third Year, unit-credit will be granted towards the requirements of that year for first-term courses completed before withdrawal, provided that:

(i) withdrawal was necessitated by a medical or family emergency; and
(ii) the student achieved a passing mark in each completed course, and an average mark of at least 55% over all completed courses.

(ii) *Examination results*

Results of the sessional examinations are mailed to students in the graduating classes about the time of Convocation, and to students in the lower years by approximately June 15. Any student who must meet an application date for another institution prior to June 15 should inform the transcript clerk in the Registrar's office in order that arrangements may be made to meet the deadline.

Admission as Barristers and Solicitors

The possession of an LL.B. degree does not in itself confer the right to practise law in British Columbia. Admission to the Bar of the Province of British Columbia is governed by the Barristers and Solicitors Act and the regulations of the Law Society of British Columbia. An applicant for admission to the Bar must comply with the requirements of the Law Society as to academic standing, professional training and ethical standards. These requirements presently include an Admission Program of approximately one year, during which the applicant must serve as an articled student with a practising member of the Bar, and complete a training course and qualifying examinations. Information should be obtained from the Secretary of the Law Society of British Columbia, 399-1148 Hornby Street, Vancouver, B.C., V6Z 2C3.

Applicants who intend to practise law in other jurisdictions should obtain information concerning the requirements for entry to the profession, from the Secretary of the governing body of the legal profession in those jurisdictions.

The U.B.C. Law Review

In 1949 the students of the Faculty of Law commenced publication of "Legal Notes", which was an annual volume containing articles and comments written both by students and by outside contributors. By 1959 the publication had increased both in size and in the number of subscribers to the point where the editors felt that the name should be changed to the University of British Columbia Law Review. It is now published twice yearly. The students are responsible for the soliciting and editing of material, and for the advertising and sales which make the Review self-sufficient. Members of the Faculty give advice and assistance to the Editorial Board of the Review, but the chief responsibility is that of the Board.

Courses of Instruction

The LL.B. program requires a student to acquire a total of 46 units in three Winter Sessions in the Faculty of Law. First Year consists of compulsory courses totalling 16 units, as described below. The Second and Third Years consist of two Winter Sessions in each of which a minimum of 14 and a maximum of 17 units may be taken. Each Session consists of two consecutive terms in each of which a minimum of 12 and a maximum of 18 hours may be taken.

FIRST YEAR

All of the first-year courses are compulsory.

SECOND AND THIRD YEARS

All students must take 379 Evidence and 300 Moot Court.

Each student must take a sufficient number of programs from the courses and seminars listed to obtain the total number of units required (46) for the LL.B. degree. Students in second and third year may not take more than seventeen units (including the non-law option) nor less than fourteen units in any one year. They may not take more than nine units or fewer than six units in any one term.

A student may not enrol in a course for which another subject is a "prerequisite" unless the required course was taken and passed earlier. In special circumstances the Dean, in consultation with the Faculty member teaching the subject, may waive this stipulation. A student may enrol in a course without taking the "recommended"

courses. However these recommendations are intended to guide student choice and students would be ill-advised to disregard them. A proposal to omit a recommended course should be discussed with a Faculty member.

A student must undertake, in either second or third year, at least one independent research project and submit a substantial paper (or series of papers) embodying the results of this research. This obligation usually will be satisfied within the seminar program but students may fulfil this obligation by completing a project, for at least 1½ units credit, under 498 Directed Research. Unless special permission is granted, a student may not receive credit for more than a total, in both second and third year, of three seminars and directed research projects.

Students may, in their second and third years (which may include the Spring Sessions and Summer Sessions between First Year, Second Year and Third Year), take work in other departments and schools of the University for credit in the Faculty of Law. Such work may be credited for not more than three units toward the second or third year unit requirements, but shall not reduce the hours or units in the Winter Sessions below the minimum requirement of 14 units. Each student must receive advance permission to register in such courses from the Curriculum Committee, which will base its judgment on its view of the relevance of the proposed course or seminar to the study of law or to a career in law and of the appropriateness of the proposed course or seminar in the light of the student's course of study in the Faculty of Law.

Graduate Studies

The degree offered is the Master of Laws (LL.M.).

Purpose: The program provides graduates with the opportunity for advanced legal education in preparation for law teaching, legal research, public service and the practice of law. It does not give entry to the British Columbia or other bar.

Standard of Admission: A candidate for admission to the graduate program must demonstrate qualifications necessary to permit engagement in creditable research in law by possessing an adequate academic foundation and a capacity for superior performance. The candidate must have a Bachelor of Laws degree or its equivalent from an approved law school, and must have obtained First Class standing (deemed to be 75% in legal studies in the Faculty of Law) or its equivalent in at least two of the courses and at least Second Class standing or its equivalent in the remaining courses of the final year of work that is accepted by the Faculty of Law as prerequisite to the Master's program.

A candidate's admission is not complete until the application has been accepted and the course of study has been approved by the Faculty of Law.

Requirements of the Program: The graduate program in law is administered by the Faculty of Law. The requirements for the LL.M. are:

(a) Full-time residence at the University for a minimum of one academic year (September to May).
(b) Lectures and seminars amounting to eight class hours per week, chosen in consultation with the Faculty of Law. These may be courses presently offered by the Faculty of Law or may be arranged specially for candidates for the LL.M. A candidate must obtain an overall average of 70% on the work of the year with no more than one mark falling below 70% and no mark below 65%.
(c) A thesis of satisfactory quality prepared under the direction of a member of the Faculty of Law on a subject related to the general program of study of the candidate. Its preparation should occupy half of the candidate's time in the program. It should normally be completed within the period of residence, but in exceptional circumstances permission may be granted for its completion after the period of residence.
(d) An oral examination covering the course work, the written work, or both. This requirement may be waived by the Faculty of Law.

The program for each candidate will be designed to meet the candidate's special needs, interests, and previous experience. Special courses may be arranged to cover various areas of the law in which the Faculty has special library or other facilities. Students may write their theses, under the supervision of members of the Faculty, in the specific fields of law in the undergraduate curriculum or in such additional fields of study as may be arranged with the Faculty.

A candidate may be allowed to select courses in other faculties of the University in substitution for those mentioned in (b) above, but it is expected that the major part of the program will be undertaken in the Faculty of Law.

Application: Candidates seeking admission to the graduate program should obtain application forms and other information from the Registrar of the University. Completed forms must be received by the Registrar by March 1 preceding the academic year for which admission is sought.

1986

THE SCHOOL OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES

(A school within the Faculty of Arts)

ACADEMIC STAFF

Professor and Director of the School:
BASIL STUART-STUBBS, B.A. (Brit. Col.), B.L.S. (McGill), F.R.S.C.

Professors:
LOIS M. BEWLEY, B.A. (Brit. Col.), B.L.S. (Toronto), M.S. in L.S. (Illinois).
RONALD A. HAGLER, B.A. (Ottawa), A.M.L.S., A.M., Ph.D. (Michigan).
ANNE B. PITERNICK, B.A. (Manchester), F.L.A.
PETER SIMMONS, A.B. (San Francisco State College), M.S. (Pratt Institute).

Assistant Professors:
TERENCE M. EASTWOOD, M.A. (Alberta), Dip.Ed. (Victoria).
RICHARD L. HOPKINS, B.Ed., B.L.S., M.L.S., M.A. (Brit. Col.).
JUDITH M. SALTMAN, B.A., B.L.S. (Brit. Col.), M.A. (Simmons).

Adjunct Professors
ALICE BACON, B.A., B.L.S. (Brit. Col.).

Part-time Lecturers:
MIRIAM CLAVIR, B.A. (Toronto), M.A.C. (Queen's).
SUZANNE C. DODSON, B.A., B.L.S. (Brit. Col.).
DEREK R. FRANCIS, B.Int.Design (Manitoba), B.L.S. (Brit. Col.).
COLIN WILLIAM FRASER, B.A., B.L.S. (McGill).
ANNA LEITH, B.A. (Brit. Col.), M.S. in L.S. (Wash.).
THOMAS J. SHORTHOUSE, B.A., B.L.S. (Brit. Col.).
ALLEN SOROKA, B.A. (Columbia College, N.Y.), LL.B. (Virginia), M.L.S. (Columbia).
REUBEN WARE, B.A. (Missouri), M.A. (Boston).

Council of the School of Library, Archival and Information Studies.
D. W. STRANGWAY, M.A., Ph.D. (Toronto), F.R.A.S., F.R.S.C., President.
R. M. WILL, B.A. (Western Ontario), A.M., Ph.D. (Duke), Dean of the Faculty of Arts.
PETER SUEDFELD, B.A. (Queen's College), M.A., Ph.D. (Princeton), Dean of the Faculty of Graduate Studies.
BASIL STUART-STUBBS, B.A. (Brit. Col.), B.L.S. (McGill), F.R.S.C.
KENNETH G. YOUNG, B.A., B.Com. (Alberta), Registrar.
JOAN ANASTASIOU, B.A., M.A., M.L.S. (Brit. Col.). Co-ordinator, Library Technicians' Programme, Vancouver Community College, Langara Campus.
WILLIAM W. BLACK, B.A. (Stanford), LL.B. (Harvard). Faculty of Law.
DAVID H. BREEN, B.A. (Alta.), B.Ed., M.A. (Calgary), Ph.D. (Alta.). Department of History.
ROSS CARTER, B.A. (Brit. Col.), M.L.S. (Washington), Director of College Resources, Vancouver Community College.
PAUL C. GILMORE, B.A. (Brit. Col.), B.A., M.A. (Cantab), Ph.D. (Amsterdam), Department of Computer Science.
KENNETH HAYCOCK, B.A. (Western Ontario), M.Ed. (Ottawa), A.M.L.S. (Michigan), Director of Library Services, Vancouver School Board.
J. L. LEIGH, B.Sc., M.Sc. (Brit. Col.), Associate Director, Computing Centre.
DOUGLAS N. McINNES, B.A., B.L.S. (Brit. Col.), University Librarian.
SHIRLEY E. MOONEY, B.A. (Saskatchewan), B.L.S. (Toronto), Library Manager, Pacific Press.
CRAIG C. PINDER, B.A. (Brit. Col.), M.A. (Minnesota), Ph.D. (Cornell), Faculty of Commerce and Business Administration.
THOMAS J. SHORTHOUSE, B.A., B.L.S. (Brit. Col.), Law Librarian.
CHARLES E. SLONECKER, D.D.S., Ph.D. (Washington), Head, Dept. of Anatomy, Faculty of Medicine.
WENDY SUTTON, B.A. (Brit. Col.), M.A. (Calif. Berkeley), Ph.D. (Michigan State), Faculty of Education.
AILEEN TUFTS, B.A. (Brit. Col.), B.L.S. (Washington), Director, Vancouver Public Library.
REUBEN WARE, B.A. (Missouri), M.A. (Boston).

THE SCHOOL OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES

History and Purpose of the School

The School has had a long history and a brief existence. Recommendations for the establishment of a school at the University go as far back as 1921 and the proposal was under active discussion during the 1940's.

In 1957 a study sponsored by the Public Library Commission of British Columbia considered the growing need for professional librarians in Western Canada and urged "the establishment of a graduate library school at the University of British Columbia within the next three years".

In the spring of 1960, the University Senate approved the establishment of a graduate library school as part of the Faculty of Arts and Science. The School of Librarianship opened on September 6, 1961, and graduated its first class in May, 1962.

In February, 1963, the program of the School was accredited by the Committee on Accreditation of the American Library Association. The program was re-accredited in 1976 and 1985 under the revised standards of the American Library Association. It is thus recognized by the American and Canadian Library Associations as fully meeting accepted standards for graduate education in librarianship.

In 1971, the one-year Bachelor's degree program in librarianship was replaced by a two-year program leading to the Master's degree. In 1981, the School in conjunction with the Department of History inaugurated a program leading to the degree of Master of Archival Studies. In 1984, the name of the School was changed to the School of Library, Archival and Information Studies.

The School prepares its students to offer effective information services in libraries, in archives, for employers in the private sector, and as self-employed intermediaries between stored information and its seekers. Information professionals identify, locate, acquire, preserve and analyze the relevance of information. In addition, the School prepares its students to anticipate and to help effect improvements in this field by balancing the teaching of sound practice with rigorous examination of its foundations in principle and theory.

Admissions Procedures

1. Enquiries and applications for admission should be addressed to the Coordinator of Admissions of the School of Library, Archival and Information Studies, 1956 Main Mall, Vancouver, B.C. V6T 1Y3, specifying either the M.A.S. or the M.L.S. program. Since enrolment in the School is limited, early application is advised. Applications should reach the school preferably by March 1 for the following September.

   A fee of $25.00 is charged for evaluating educational documents issued by institutions not in British Columbia. The fee must accompany the application for admission form when submitted with supporting documents. The fee is non-refundable and is not applicable to tuition.
2. It is the policy of the School to accept only students whose personal and academic qualifications will fit them for successful practice in the library and archival professions. Personal interviews will ordinarily be required of all students and in some cases students may be asked to take academic or aptitude tests prior to admission.
3. The School places no absolute stipulations with respect to age of applicants. However, preference in admissions is given to applicants who have been actively engaged within recent years in library or archival work, teaching, academic studies or some similar intellectual pursuit.
4. The School has a limited enrolment. The number of qualified applicants exceeds by a wide margin the number of available places. In recent years, therefore, those entering the school have been considerably above the minimum required academic standard.

Language Requirement

Reading knowledge of a language other than English and, where the native language is not English, demonstrated facility in the use of English, is a prerequisite for admission to both the M.L.S. and the M.A.S. programs.

A working knowledge of more than one language is of the greatest benefit in the work of the information professional. The formal requirements may be met by:

(a) Presentation of transcripts showing at least the equivalent of six units of credit after junior matriculation in the study of a language within the past seven years (the School may, in particular circumstances, accept three units of credit in each of two languages). It may be noted that some language departments of this university offer six-unit intensive courses for the beginner in a language.

(b) Undertaking a directed program of reading, followed by successful completion of a reading test, both administered by the School and formulated to meet the particular needs of the applicant who cannot satisfy the requirements in (a).

Provisional admission may be granted pending the completion of the requirement before the beginning of classes. Knowledge of a computer language, while very useful to the information professional, is not accepted as equivalent to knowledge of a natural language.

Academic Regulations

Attention is drawn to the general academic regulations of the University and the general information at the beginning of this Calendar.

1. A student will be required to withdraw from the Master of Library Science program unless an overall average is obtained of not less than 65% in the 500-level courses of the core program, with no individual courses failed; or if an overall average of 65% is not maintained through the rest of the program.
2. A student will be required to withdraw from the Master of Archival Studies program unless an overall average of 65% is obtained in the required courses of the first year; or if an overall average of 65% is not maintained through the rest of the program.
3. Courses will be graded as follows: 1st class: 80% over over; 2nd class: 65% to 79%; Pass: 60% to 64%; Fail: below 60%.
4. The School reserves the right to require a student to withdraw from the M.L.S. or M.A.S. program if considered to be unsuited to proceed with the study or practice of the library or archival profession.
5. If a student fails a required course in either program, it may be repeated at the discretion of the School faculty or a supplemental examination may be granted. The same provision applies to an elective course, but in this case an alternate course may be taken instead.
6. Colloquia, field trips, and field work are integral parts of both programs and satisfactory participation in them is required of all students.
7. Term essays and examination papers may be refused a passing mark if they are, in the opinion of faculty, deficient in English.

General Information

Location.—The School of Library, Archival and Information Studies is located on the top floor of the North Wing of the University Library.

Instructional Pattern.—The instructional pattern employs a wide variety of approaches including lectures, laboratories, discussions, seminars, directed study, colloquia, field trips and field work. Students are encouraged to work closely with faculty members and each student has an individual adviser available for consultation and specific assistance.

Academic Load.—The M.L.S. and M.A.S. programs each call for a minimum of eighteen hours of lectures and laboratories per week, plus field trips, colloquia and field work. Most students spend two or three hours on readings and assignments for each hour of class. The normal academic load is therefore estimated at about 60 hours per week.

Part-Time Work.—University policy limits full-time students to ten hours work per week in campus jobs. Students should note that the academic load of the School is heavy. All inquiries for part-time work at the University should be directed to the Canada Employment Centre, Brock Hall.

Field Trips.—Field trips are arranged within the Session. For the most part these are one or two-day visits of observation in the libraries or archives in the vicinity of the School, on Vancouver Island, and in Washington State. Students are responsible for most expenses incurred during field trips and the required field work or practicum which are a part of each program.

Typing Ability.—Students are expected to develop some facility in typing before entering the School, because a large part of the work is normally submitted in typewritten form, and because students will be required to make efficient use of the computer-terminal keyboard.

Attendance.—A student who cannot attend classes, field trips, etc., should notify the instructor concerned in writing.

Placement.—The School does not guarantee positions to its graduates, but makes every effort to place them in positions suited to their aptitudes and interests.

Library Resources.—The University of British Columbia Library is the largest in Western Canada. Its total resources comprise over 2,300,000 volumes and microfilms, with special strength in bibliographies, reference works and serials. The collection in the field of library science alone now numbers over 10,000 titles, and children's books are available in three other special collections. The library's holdings of archival collections are extensive, and include the University Archives. The library is also one of the most highly automated in North America, having used computers extensively since 1965.

In addition to the range of libraries available to students on campus a wide variety of library and archival services is within easy reach. Students have these at their disposal for use and for observation both informally and on formal visits arranged by the School.

Academic, public and special libraries and archives can be found at all stages of development and provide an excellent balance to the academic program of the School.

MASTER OF LIBRARY SCIENCE

The Nature of Librarianship

Libraries today are a basic resource for formal education at all levels, the chief means of self-education, indispensable for scholarship and research, a rewarding recreational facility, and a major channel for the dissemination of information. The role of librarians is to translate the library's potential into effective, efficient service by making available a wide range of materials in all media, by organizing and describing these materials so as to facilitate their use, by stimulating the use of such materials, and by assisting and participating in the many-sided pursuit of information.

Advances in electronic technology and information management provide opportunities for librarians to work outside the typical library setting. Planning and developing bibliographic and non-bibliographic data bases and searching systems, designing and operating library and information networks, and providing information search services on a free-lance basis are characteristic of professional functions. Graduates of the School need to understand and appreciate the application of computer technology to information management, the ways in which information is communicated to a variety of user groups, and policies which affect the free flow of information.

Admission

Candidates for admission will be of two types: (1) those beginning study in librarianship for the first time, and (2) those who have already earned the B.L.S. degree or its equivalent but desire additional specialized education.

1. Admission requirements for new entrants are as follows: the candidate
   (a) must hold a Bachelor's degree from a recognized university;
   (b) must have achieved at least second class standing in the last two years of undergraduate study;
   (c) must show promise of superior professional performance as attested by letters of reference and a personal interview;
   (d) must fulfil the language requirement described above;
   (e) should preferably have had a minimum of one year's experience in a library.
2. Admission requirements for students already having professional qualifications are as follows: the candidate
   (a) must have a B.L.S. degree from a library school whose program is accredited by the American Library Association, or the equivalent thereof.
   (b) must have demonstrated superior professional performance as attested by letters of reference and a personal interview.
   (c) must fulfil the language requirement described above.

Undergraduate Preparation

Adequate and relevant undergraduate preparation is considered an integral part of a librarian's professional formation by all accrediting agencies. Undergraduate students who are considering librarianship as a career should consult the School about their courses. Interviews may be arranged at any time.

A broad cultural background is expected of all prospective librarians, and students should therefore, in the first and second years, select for electives courses which will give them some acquaintance with the humanities, sciences, and social sciences. In the work of the third and fourth years, students should seek to gain special competence in at least one field of knowledge related insofar as can be foreseen to special areas of interest within librarianship. For example, students contemplating careers in public libraries would do well to take courses in government, public administration and the like. In addition, a candidate should be able to reflect a wide range of reading and recreational interests.

A reading knowledge of languages is useful in all areas of library work and essential in many. Students are advised to acquire a working knowledge of at least two major languages other than English.

Basic courses in statistics and computer science are also recommended.

Requirements for the Degree

A. Entrants without a previous librarianship qualification

Students beginning study of librarianship for the first time must complete at least thirty units of credit courses approved by the faculty for the M.L.S. program, plus such non-credit studies (e.g. field work, colloquia) as may be required.

The program must begin in the fall term, during which the student will take all of, and only, a 'core program' of four required courses representing the knowledge that should be common to all librarians. These courses are LIBR 500, 505, 510 and 520, credited with 7½ units together. No other course in the program may be begun for credit toward the degree until this core has been successfully completed. In addition to the four courses of the 'core', LIBR 623 and LIBR 626 are required courses. They may be taken at any time, but note that they are prerequisite to other courses. All elective LIBR courses will be chosen under guidance from the student's faculty adviser to ensure proper sequencing and a balanced program.

The students must take the first fifteen units of the program on a full-time basis, completing an additional 7½ units within the same Academic Year as the core. The remaining fifteen units need not be started immediately thereafter, and may be taken on a part-time basis. However, all degree requirements must be met within a period of five years after initial registration.

Upon successful application to the faculty, up to six units of the required thirty may be credited on the basis of courses taken outside the Librarianship program of the School. These may comprise courses taken during the student's enrolment in the M.L.S. program, or may be courses taken after completion of the Bachelor's degree but before enrolment in the M.L.S. program. Wherever and whenever taken, such courses must be at the UBC 300-level or above, or the equivalent. The faculty's decision on whether to permit credit for non-'LIBR' or 'ARST' courses will be based on a judgement of their *direct* relevance to the individual's study of librarianship.

B. Entrants who already possess a librarianship qualification

A student already holding an acceptable qualification in librarianship may be admitted at the beginning of any term, and must complete at least fifteen units of credit chosen under the guidance of the student's adviser. At the faculty's discretion, particularly if more than five years have elapsed since the award of the earlier qualification, or if it did not adequately encompass the subject matter of the present core program, additional units of course work may be required. The whole program must be completed within four years from the date of registration.

If such a student is admitted with a B.L.S. from The University of British Columbia, the program may be completed by part-time study, and courses taken outside the School may be credited as specified above. Where any other librarianship qualification is the basis for admission, the fifteen-unit program must all be taken at U.B.C. following registration for the M.L.S., and one term (normally 7½ units) must be completed as a full-time student.

Field Work

The field work comprises a period of two to three weeks. It gives the student directed experience under actual operating library conditions. Libraries in British Columbia and elsewhere cooperate in offering students such opportunities. Students with considerable experience in library work may be permitted to choose a special project in lieu of field work.

Courses Taken in Other Library Schools

Some credit for courses taken in other library schools may be granted in cases where such courses are equated with those in the School of Library, Archival and Information Studies. Applications for such transfer of credit should be addressed to the Director.

Admission to 600-level courses

Few of the courses listed in the Calendar have stated prerequisites. However, the core program of 500-level courses is prerequisite to most elective courses at the 600 level. Students who have not completed the core program at this School or its equivalent at another accredited library school will not normally be permitted to enrol in or audit such 600-level courses. Students not registered in the M.L.S. program who wish to enrol in or audit any courses should apply to the Director.

Law Concentration

The School, in conjunction with the Faculty of Law, offers a concentration of three elective courses constituting a concentration in Law Librarianship following completion of the core program or equivalent.

Courses in the Concentration are:

LAW 201 (1½) *Introduction to the Legal Process* (taken in the Faculty of Law); LIBR 608 (1½) *Legal Bibliography and Information Services*; LIBR 648 (1½) *Law Library Administration*.

MASTER OF ARCHIVAL STUDIES

A two-year, full-time program administered by the Department of History and the School of Library, Archival and Information Studies.

The Nature of Archival Work

The profession of archival work is beginning to develop in Canada and is already well developed in many other areas of the world. There is certain to be an increasing need for specialists in this field, not only because archival repositories themselves will need staffing as they are established and expand, but because archivists are needed in many other areas of activity. Archival work is closely linked with record management. Many large libraries, as distinct from archival repositories, hold collections of archival and manuscript material especially in rare book and special collections. Archival work is also an important adjunct to bibliographical work where no borderline is drawn between archival, manuscript, and printed materials. It is therefore envisaged as an area of growing importance and in Canada may well be linked closely with the growing emphasis on Canadian historical and literary studies.

Admission

Candidates for admission to the program must:

(a) Possess bachelor's degree from a recognized university in a relevant discipline or in an area which is regarded as appropriate to the proposed study by an Admissions Committee which will represent both the Department of History and the School of Library, Archival and Information Studies. Candidates must have achieved a good second-class standing in the last two years of undergraduate study.

(b) Show promise of superior professional performance as attested by letters of reference and a personal interview.

(c) Fulfil the language requirement described above.

Pattern of Required Courses

First Year	**Units**
ARST 500—Introduction to Archives and Manuscript	3
ARST 510—Records Management	1½
ARST 520—Automation and Archives	1½
ARST 530—Practicum	1½
HIST 545—Canadian Historiography and Historical Methods	3
Electives	4½

NOTE: The practicum will be at an archival repository which is approved by the Co-ordinating Committee of the program.

Second Year	
ARST 600—Advanced Archives and Manuscript	3
ARST 615—Directed Study	1½
ARST 620—Thesis	6
Electives	4½

Examples of elective courses which would be permitted by the Advisory Committee

ARST 610—Preventive Conservation of Materials	1½
ARST 614—Advanced Seminar	1½
ECON 336—Economic History of Canada	3
ENGL 420—Canadian Literature	3
GEOG 327—Historical Geography of Canada, I: Canada Before 1850	1½
GEOG 328—Historical Geography of Canada, II: Canada After 1850	1½
GEOG 427—Environment and Society in Early British Columbia	3
HIST 303—History of Canadian West	3
HIST 329—The Social Development of Canada	3
HIST 404—British Columbia	3
HIST 595—Oral History and Genealogy	1½
LIBR 615—Rare Books and Special Collections	1½
LIBR 621—Indexes and Indexing	1½
LIBR 622—Information Retrieval Systems (ARST 520 Prerequisite for LIBR 621 and LIBR 622)	1½
LIBR 654—Research Methods in Libraries and Archives	1½
LIBR 661—Historical Bibliography	1½
LIBR 662—Analytical Bibliography	1½
POLI 304—B.C. Government and Politics	1½
POLI 306—Local Government and Politics in Canada	1½

Requirements for the Degree

The Master's degree is awarded on the completion of 30 units of work. Of these, 21 units are covered by the required courses ARST 500, 510, 520, 530, 600, 610, 620 and HIST 545. Nine units of elective courses will be selected in consultation with the student's adviser in order to round out but not to duplicate a student's undergraduate or graduate studies. The first year of the program requires full-time attendance. Before being admitted to the second year, students must have completed at least 15 units, consisting of the first-year required courses, electives and the practicum. All degree requirements must be met within five years after initial registration.

AWARDS AND FINANCIAL ASSISTANCE

A supplement to this Calendar entitled "Awards and Financial Aid" contains a list of current academic awards (scholarships, prizes, etc.) and available financial assistance (grants, bursaries and loans). Students are encouraged to consult the Supplement to determine awards for which they may be eligible. For further information and application forms contact Awards and Financial Aid, General Services Administration Building, The University of British Columbia, Vancouver, British Columbia. V6T 1W5.

The following awards are not administered by Awards and Financial Aid.

A limited number of scholarships and grants-in-aid for study at any accredited library school are offered to science graduates by the National Research Council of Canada. Application forms may be obtained from the Scholarships Division, Natural Sciences and Engineering Research Council of Canada, Ottawa K1A 0R6. Other scholarships, loans and bursaries available on the national and provincial level are listed in the leaflet *Financial Assistance for Library Education*, published by the American Library Association, 50 East Huron St., Chicago, Il. 60611. This leaflet may also be obtained in most university and public libraries.

Scholarships and grants-in-aid for archival studies, which is a new field, are even more limited than for librarianship. One major scholarship is offered by the British Columbia Heritage Trust. The Willard E. Ireland Scholarship in British Columbia History or Archival Management is open to students enrolling in the M.A.S. program. Application forms may be obtained from The British Columbia Heritage Trust, Parliament Buildings, Victoria, B.C., V8V 1X4.

THE FACULTY OF MEDICINE

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A. J. SALVIAN, M.D. (Ontario), F.R.C.S.(C), Clinical Assistant Professor.
F. R. SHARP, M.B., Ch.B. (Edinburgh), M.Sc. (Brit. Col.), F.R.C.S.(C), Clinical Assistant Professor.
JOSEPH G. SLADEN, M.D. (Toronto), F.R.C.S.(C), Clinical Assistant Professor.
F. G. WESTGATE, B.A. (Sask.), M.D. (Toronto), F.R.C.S.(E), F.R.C.S.(C), F.A.C.S., Clinical Assistant Professor.
R. A. WHITE, B.A. (Brit. Col.), M.Sc. (Minnesota), M.D. (Wash.), F.R.C.S.(C), Clinical Assistant Professor.
D. A. BROWN, M.D., F.R.C.S.(C), Clinical Instructor.
IVERSEN KARSTEN, M.D. (Copenhagen), F.R.C.S.(C), Clinical Instructor.
URVE KUUSK, M.D. (Brit. Col.), F.R.C.S.(C), Clinical Instructor.
L. DOYLE, M.D. (Brit. Col.), F.R.C.J.(C), Clinical Instructor.

Division of Cardiovascular and Thoracic Surgery

G. F. O. TYERS, M.D. (Brit. Col), F.R.C.S.(C), F.A.C.S., Professor and Head of the Division.
BILL NELEMS, B.A.Sc., M.D. (Tor.), F.R.C.S.(C), Associate Professor.
PETER ALLEN, M.D. (Toronto), F.R.C.S.(C), F.A.C.S., Clinical Professor.
A. N. GEREIN, B.A., M.D. (Brit. Col.), F.R.C.S.(C), F.A.C.S., Clinical Associate Professor.
J. C. OPIE, M.B., Ch.B. (Otago), F.R.C.S. (London), Clinical Assistant Professor.
W. R. E. JAMIESON, B.A. (New Brunswick), M.D. (Dal.), F.R.C.S.(C), Clinical Associate Professor.
R. T. MIYAGHISHIMA, B.A., M.D. (Brit. Col.), F.R.C.S.(C), F.A.C.S., Clinical Associate Professor.
A. IAN MUNRO, M.B., B.S. (London), F.R.C.S. (England), F.R.C.S.(C), Clinical Associate Professor.
H. TUTASSAURA, B.A., M.D. (Bogota), F.R.C.S.(C), Clinical Assistant Professor.
MICHAEL T. JANUSZ, M.D. (Man.), F.R.C.S.(C), Clinical Instructor.
L. H. BURR, B.A., M.Sc., M.D. (Brit. Col.), F.R.C.S.(C), Clinical Instructor.
K. G. EVANS, B.Sc., M.D. (Brit. Col.), F.R.C.S.(C), Clinical Instructor.
ROBERT HAYDEN, M.D. (McGill), F.R.C.S.(C), Clinical Instructor.
JACQUES LeBLANC, M.D. (Laval), F.R.C.S.(C)., Clinical Instructor.
H. LING, M.B., F.R.C.S. (Ed.), F.R.C.S.(C), Clinical Instructor.

Emergency Room Physicians

JAMES M. CHRISTENSON, B.Sc., M.D. (Ottawa), C.C.F.P. (Calgary), Clinical Assistant Professor.
MICHAEL S. DETTMAN, M.D. (Brit. Col.), Clinical Assistant Professor.
WILLIAM J. LANG, M.D. (Toronto), Clinical Assistant Professor.
ALEXANDER B. MORRISON, Ph.D., M.B., B.S. (Univ. College, England), Clinical Assistant Professor.
VICTOR WOOD, B.Sc., M.D. (Man.), Clinical Assistant Professor.

1986-87

PAUL ASSAD, M.D. (Ottawa), A.B.E.M. (Part I), Clinical Instructor.
JAMES D. CAMERON, M.D., E.M.R.C. (McGill Roy. Victoria Hosp.), Clinical Instructor.
JOHN M. CARTHY, M.D. (Queen's), Clinical Instructor.
KWOK-SUM CHAN, M.B. B.S. (Hong Kong), Clinical Instructor.
STEPHEN DAY, M.D. (Toronto), A.B.E.M. (Part I), Clinical Instructor.
GILBERT DYCK, M.D. (Brit. Col.), Clinical Instructor.
SHELDON GLAZER, M.D.C.M., A.B.E.M. (Part I & II), Clinical Instructor.
LOIS E. GRAHAM, M.B.B.S. (Univ. College of the West Indies), Clinical Instructor.
DAVID G. HUNT, M.D. (Brit. Col.), Clinical Instructor.
V. P. J. KRAJINA, M.D. (Dalhousie), Clinical Instructor.
KENNETH T. KRISTJANSON, M.D. (Manitoba), Clinical Instructor.
JACQUES O. J. LAFLEUR, M.D. (Ottawa), C.C.F.P., E.M.R.C., Clinical Instructor.
DONALD C. MACDONALD, M.D. (Toronto), Clinical Instructor.
R. B. MATTHEWS, M.D. (Queens), Clinical Instructor.
BARRY J. MILLER, M.D. (Western Ont.), Clinical Instructor.
DOUGLAS M. MOSELEY, M.D. (Brit. Col.), Clinical Instructor.
R. J. MULLER, M.D. (Dalhousie), Clinical Instructor.
BRIAN OLDRING, M.D. (Alberta), Clinical Instructor.
HERBERT E. PARKIN, M.D. (Queen's), Clinical Instructor.
ROY A. PURSSELL, M.D. (Brit. Col.), E.M.R.C. (McGill), Clinical Instructor.
ROBERT C. SAUNDERS, M.D. (Dalhousie), Clinical Instructor.
DONALD H. SCHREIBER, M.D.C.M. (McGill), E.M.R. Program (L.A. County Med. Centre), Clinical Instructor.
LESLIE VERTESI, M.D. (Toronto), Clinical Instructor.
PAUL A. ZICKLER, M.D. (Western Ont.), Clinical Instructor.

Division of Neurosurgery

GORDON B. THOMPSON, B.Sc. (Man.), M.D., C.M. (McGill), F.R.C.S.(C), F.A.C.S., Professor (Part-time) and Head of Division.
F. DURITY, B.A., M.D. (Brit. Col.), F.R.C.S.(C), Associate Professor.
I. M. TURNBULL, M.D. (Brit. Col.), F.R.C.S.(C), Associate Professor.
D. J. FAIRHOLM, M.D. (Alta.), F.R.C.S.(C), Clinical Associate Professor.
D. E. GRIESDALE, B.Sc., M.D. (Toronto), F.R.C.S.(C), Clinical Assistant Professor.
P. J. MURRAY, M.D. (N. U. Ireland), M.Sc. (McGill), F.R.C.S.(C), Assistant Professor (Part-time).
P. STEINBOK, B.Sc. (Newcastle-upon-Tyne), M.B., B.S. (W. Indies), F.R.C.S.(C), Clinical Assistant Professor.
W. B. WOODHURST, M.D. (Brit. Col.), F.R.C.S.(C), Clinical Assistant Professor.

Division of Otorhinolaryngology

P. J. DOYLE, B.Sc., M.D., (Alta.), C.R.C.S., F.R.C.S.(C), Professor and Head of the Division.
M. D. MORRISON, M.D. (Sask.), F.R.C.S.(C), Associate Professor.
D. W. F. SCHWARZ, M.D. (Freiburg), Dr. Med. (Germany), Associate Professor.
GARNET A. BADGER, M.D. (Alta.), F.R.C.S.(C), Clinical Associate Professor.
KENNETH G. CAMBON, B.A., M.D., C.M. (McGill), F.R.C.S.(C), Clinical Associate Professor.
ROBERT I. DICKSON, B.Sc., M.D. (Man.), F.R.C.S.(C), Clinical Associate Professor.
R. A. MCNEILL, M.B., B.Ch., M.Ch. (Belfast), M.D. (Edinburgh), F.R.C.S.(E), F.R.C.S.(C), F.A.C.S., Clinical Associate Professor.
K. H. RIDING, M.B., B.S. (London), M.R.C.S., L.R.C.P. (Eng.), F.R.C.S.(C), Clinical Associate Professor.
IRWIN F. STEWART, B.A., M.D. (Brit. Col.), F.R.C.S.(C), Clinical Associate Professor.
ANDRIS BLOKMANIS, M.B., B.S. (Melbourne), F.R.C.S.(C), F.R.A.C.S., Clinical Assistant Professor.
J. R. DMYTRYSHYN, B.A., M.D. (Sask.), F.R.C.S.(C), Clinical Assistant Professor.
D. A. GILLANDERS, M.D. (Brit. Col.), F.R.C.S.(C), Clinical Assistant Professor.
N. S. LONGRIDGE, B.Sc., M.B., Ch.B. (Newcastle), F.R.C.S.(Eng.), F.R.C.S.(C), Clinical Assistant Professor.
T. M. MITCHELL, B.A., M.D. (Brit. Col.), F.R.C.S.(C), Clinical Assistant Professor.
WILLIAM J. PATTERSON, M.D. (Ottawa), F.R.C.S.(C), Clinical Assistant Professor.
E. F. J. RUEBEN, M.D. (Heidelberg), F.R.C.S.(C), Clinical Assistant Professor.
E. G. N. SINANAN, M.B., B.Ch., B.A.O. (Queen's Belfast), F.R.C.S(C), Clinical Assistant Professor.
GLEN W. SMITH, B.S.P., M.D. (Brit. Col.), M.Sc., F.R.C.S.(C), Clinical Assistant Professor.
DONALD W. ANDERSON, M.D. (Alberta), F.R.C.S.(C), Clinical Instructor.
M. P. BANNO, B.A., M.D. (Brit. Col.), F.R.C.S.(C), Clinical Instructor.
S. W. CIVKIN, B.Sc., M.D. (Man.), C.R.C.S.(C), F.R.C.S.(C), Clinical Instructor.
K. R. DUBETA, M.D. (Alberta), F.R.C.S.(C), Clinical Instructor.
R. E. G. GOSLING, M.D., M.R.C.S. (England), L.R.C.P. (London), F.R.C.S.(C), Clinical Instructor.
D. KLASSEN, M.D. (Alta.), F.R.C.S.(C), Clinical Instructor.
A. K. Y. LEUNG, B.Sc., M.D. (McGill), F.R.C.S.(C), Clinical Instructor.
F. C. MALBY, M.D. (Queen's), F.R.C.S.(C), Clinical Instructor.
S. S. CHRISTOPHER MAN, M.D. (Manit.), F.R.C.S.(C), Clinical Instructor.
D. R. MINTZ, M.D., F.R.C.S.(C), Clinical Instructor.
H. D. MORRIS, M.D. (Brit. Col.), F.R.C.S.(C), Clinical Instructor.
M. A. ROSS, M.B., Ch.B. (Liverpool), F.R.C.S. (Edinburgh), F.R.C.S.(C), Clinical Instructor.
LESLEY J. SALKELD, M.B., Ch.B., (New Zealand), F.R.C.S.(C), F.A.C.S., F.R.A.C.S., Clinical Instructor.
J. MICHAEL SMITH, M.B., B.Ch., F.R.C.S.(C), Clinical Instructor.
J. WOODHAM, M.B. (Manchester), F.R.C.S.(C), Clinical Instructor.
THONG N. CHEE, M.B., F.R.C.S.(I), F.R.C.S.(C), Instructor (part-time).

Division of Paediatric Surgery

PHILIP G. ASHMORE, M.D. (Toronto), F.R.C.S.(C), Clinical Professor and Head of the Division.
G. C. FRASER, M.B., B.S. (Aberdeen), F.R.C.S. (England), F.R.C.S. (Edinburgh), F.R.C.S.(C), F.A.C.S., Clinical Associate Professor.
R. H. MARSHALL, M.D. (Toronto), F.R.C.S.(C), F.A.A.P., Clinical Assistant Professor.
GEOFFREY BLAIR, M.D. (Toronto), F.R.C.S.(C), Clinical Instructor.

Division of Plastic Surgery

ALBERT D. COURTEMANCHE, M.D. (Toronto), F.R.C.S.(C), Clinical Professor and Head of the Division.
C. F. T. SNELLING, M.D. (Toronto), F.R.C.S.(C), Associate Professor.
R. J. COWAN, M.D. (Toronto), F.R.C.S.(C), Clinical Professor.
D. G. FITZPATRICK, M.D. (Brit. Col.), F.R.C.S.(C), Clinical Assistant Professor.
B. FOLEY, M.B., Ch.B. (St. Andrews), F.R.C.S.(C), Clinical Assistant Professor.
D. A. KESTER, M.D., M.Sc. (Brit. Col.), F.R.C.S.(C), Clinical Assistant Professor.
P. A. MacKAY, B.A., M.D., C.M. (McGill), F.R.C.S.(C), Clinical Assistant Professor.
Q. R. SON-HING, M.B., Ch.B. (Cape Town), F.R.C.S.(C), Clinical Assistant Professor.
R. P. THOMPSON, M.D. (Sask.), F.R.C.S.(C), Clinical Assistant Professor.
R. J. WARREN, M.D. (Brit. Col.), F.R.C.S.(C), Clinical Instructor.

Division of Radiation Oncology

S. M. JACKSON, M.B., Ch.B., M.D. (Manchester), D.M.R.T. (London), F.F.R. (London), F.R.C.P.(C), Clinical Professor and Head.
G. B. GOODMAN, M.B., Ch.B. (Edinburgh), D.M.R.T. (London), F.R.C.P.(C), Clinical Professor.
VIVIEN BASCO, M.B., Ch.B. (Birmingham), D.M.R.T. (London), F.R.C.R., C.R.C.P.(C), F.R.C.P.(C), Clinical Associate Professor.
PETER COY, M.D., F.R.C.P.(C) Clinical Assistant Professor.
GLEN M. CRAWFORD, M.D. (West. Ont.), D.M.R.T. (London), F.R.C.P.(C), Clinical Assistant Professor.
R. N. FAIREY, B.Sc., M.D. (Brit. Col.), F.R.C.P.(C), Clinical Assistant Professor.
A. D. FLORES, B.Sc., M.D., M.B., (San Marcos), C.R.C.P.(C), F.R.C.P.(C), Clinical Assistant Professor.
A. C. GRAFTON, M.B., B.S. (London), F.R.C.S.(C), Clinical Assistant Professor.
E. HADZIC, M.D. (Zagreb), F.R.C.P.(C), Clinical Assistant Professor.
CHARLES M. LUDGATE, M.B., Ch.B., M.D. (Edinburgh), Clinical Assistant Professor.
M. F. MANJI, M.B., Ch.B. (Makerere), D.M.R.T. (Toronto), F.R.C.P.(C), Clinical Assistant Professor.
N. J. S. VOSS, L.R.C.P., M.R.C.S., D.M.R.T., F.R.C.R. (England), F.R.C.S.(C), Clinical Assistant Professor.
E. C. KOSTASHUK, M.D., C.C.F.P., F.R.C.P.(C), Clinical Instructor.

Division of Urology

MARTIN McLOUGHLIN, M.D. (Brit. Col.), F.R.C.S.(C), F.A.C.S., Professor and Head of the Division.

P. J. MOLONEY, B.A., (Brit. Col.), M.D. (Wash.), F.R.C.S.(C), Associate Professor.
LORNE D. SULLIVAN, M.D. (Sask.), F.R.C.S.(C), Clinical Professor.
G. J. ANKENMAN, M.D., C.M. (Queen's), F.R.C.S.(C), Clinical Associate Professor.
H. W. JOHNSON, M.D. (Man.), F.R.C.S.(C), F.A.A.P. Clinical Associate Professor.
A. D. C. MANSON, M.D. (Brit. Col.), M.Sc. (McGill), F.R.S.C.(C), Clinical Associate Professor.
G. U. COLEMAN, B.Sc., M.D. (Brit. Col.), F.R.C.S.(C), Clinical Assistant Professor.
H. N. FENSTER, B.Sc., M.D., C.M. (McGill), F.R.C.S.(C), Clinical Assistant Professor.
J. E. WRIGHT, M.D. (Alta.), F.R.C.S.(C), Clinical Assistant Professor.
S. L. CHAN, M.D. (Brit. Col.), F.R.C.S.(C), Clinical Instructor.
S. L. GOLDENBERG, M.D., (Toronto), F.R.C.S.(C), Clinical Instructor.
L. LEE, M.D., F.R.C.S.(C), Clinical Instructor.
J. MASTERSON, M.D., F.R.C.S.(C), Clinical Instructor.
A. J. MOORE, M.D. (W. Ont.), F.R.C.S.(C), Clinical Instructor.
Z. PERLER, M.D. (Alta.), F.R.C.S.(C), Clinical Instructor.
PAUL RENNIE, B.Sc. (W. Ont.), Ph.D. (Alta.), Honorary Associate Professor.
NICHOLAS BRUCHOVSKY, M.D., Ph.D. (Toronto), F.R.C.P.(C), Associate-Member (Medicine).

FACULTY OF MEDICINE

General Information

1. The Undergraduate Medical Program
2. Postgraduate (Residency) Training Programs
3. Bachelor of Medical Laboratory Science (B.M.L.Sc.) Degree

1. The Undergraduate Medical Program

The medical course extends through four academic sessions and leads to the degree of Doctor of Medicine (M.D.).

Curriculum

The academic session in first year is of thirty-five weeks' duration, divided into a first phase of twenty-four weeks, and a second phase of nine weeks, each succeeded by an examination period of one week. The second year is of 35 weeks' and the third year of 32 weeks' duration including examinations. The final year is of 52 weeks' duration (including two weeks' vacation).

In the first twenty-four weeks, the student is given a broad understanding of the scientific basis of modern medicine through correlated courses in anatomy, biochemistry and physiology. From the beginning, these are illustrated by an introduction to clinical practice. An awareness of the social issues in medicine is fostered, as is the history of the health sciences. Anatomy and biochemistry conclude at the end of the first phase, but physiology continues, to join with general pathology and medical microbiology in a transition from normal to abnormal physiology concluding at the end of the second phase of first year. In the first term of second year, pharmacology is given with pathology, medical microbiology and introductory courses in psychiatry and medical genetics. A correlated course in neurological sciences is also presented during this term. This enables an integrated system approach to clinical medicine to be started in the second term of second year and to continue for three terms. The essentials of modern diagnosis and treatment are presented by the clinical departments in a series of lectures, demonstrations and seminars, integrated by systems and illustrated by bedside clinics given in the affiliated teaching hospitals. Instruction in history-taking and physical examination is given during ward work sessions each afternoon. To enable the student to return to areas of interest in the basic sciences aroused by clinical work or to meet future needs in practice or research, electives in the basic sciences are required in the second term of third year. Fourth year is a clinical clerkship, and offers the senior medical student a wide range of opportunities for applying knowledge of clinical medicine under supervision in the teaching hospitals by means of rotations within the clinical departments. As part of the clerkship year, an elective period (seven or eight weeks) is offered which affords the student a wide opportunity of choices in the clinical departments of the teaching hospitals or in the community hospitals of B.C. Should the student so desire, he may present his own elective program to the Faculty for approval.

During the program sufficient time for independent study has been set aside to allow and encourage the student to take responsibility for his own progress in meeting the broad objectives of the undergraduate medical course.

The first year of the course is given mainly on the campus but starting in the second year instruction is increasingly transferred to the affiliated teaching hospitals (Vancouver General Hospital, St. Paul's Hospital, Shaughnessy Hospital, Grace Hospital, Children's Hospital, Cancer Control Agency of British Columbia, and the Health Sciences Centre Hospitals on the campus). In addition, the facilities of the Lions Gate Hospital, the Provincial Mental Hospital, G. F. Strong Rehabilitation Centre, Canadian Arthritis and Rheumatism Society Centre are used for various aspects of clinical teaching, as well as other community resources, including B.C. community hospitals.

Schools within the Faculty of Medicine

The **School of Rehabilitation Medicine** is a component of the Faculty of Medicine which offers training in physical and occupational therapy. The **School of Audiology and Speech Sciences** is also a part of the Faculty and provides instruction in speech pathology. Information concerning the School may be found elsewhere in this calendar and enquiries should be sent to the Director of the School.

Admission to the Faculty of Medicine

Entrance Requirements

Candidates for admission to the Faculty of Medicine must have completed, as a minimum, three full years in the Faculty of Science or the Faculty of Arts at the University of British Columbia (45 units of academic credit), or the equivalent thereof.

All applicants must have completed the following University level prerequisite courses by May of the year in which they are applying for admission to Medicine: (Note: Advance credit will not be granted for Grade 13 courses.)

(1) English 100 (Literature and Composition) or equivalent.
(2) Mathematics 100 (Calculus I) and Mathematics 101 (Calculus II) or Statistics 105 (Descriptive and Elementary Inferential Statistics.)
OR Mathematics 130 (Finite Combinatorial Mathematics).
(3) Physics 110 (Mechanics, Electricity and Atomic Structure)
OR Physics 115 (Wave Motion, Mechanics and Electricity)
OR Physics 120 (Mechanics).
(4) Biology 101 or 102 (Principles of Biology) or equivalent.
(5) Chemistry 110 or 120 (Principles of Chemistry)
OR Chemistry 103 (General Chemistry) or equivalent.
(6) Chemistry 203 or 230 (Organic Chemistry) or equivalent.
(7) Biochemistry 300 or Biology 201 and Biochemistry 302 or Biology 201 and Biochemistry 303 or the equivalent.

The foregoing prerequisite courses are required of students taking premedical programs at the University of British Columbia. Students taking premedical studies at other universities must submit evidence of having successfully completed equivalent courses in these subjects.

The Medical College Admission Test (MCAT)

All candidates are required to take the Medical College Admission Test. It is strongly recommended that applicants complete this examination in the Fall of the year prior to the year that they apply for entrance to Medical School. It is advisable to complete all of the above-listed prerequisite courses before taking the MCAT. The design of this test was changed in the spring of 1977 and all candidates for admission to Medicine in the 1978 and subsequent entering classes are required to take the MCAT in its new (post 1976) format.

Arrangements to take the Medical College Admission Test should be made with the counselling service of the institution at which the student is taking premedical studies. Information regarding the test may be obtained from The American College Testing Program, P.O. Box 414, Iowa City, Iowa 52240, U.S.A., or from the Student Counselling and Resources Centre at the University of British Columbia. When the test is taken the candidate should request that the test scores be sent to The Admissions Committee, Faculty of Medicine, University of British Columbia, Vancouver, B.C., V6T 1W5.

Required Academic Standards

The minimum acceptable academic standing for admission to the Faculty of Medicine is an overall average of 70% (or the equivalent in other grading systems) based on grades received in all university-level courses completed to the time of application. Achievement of this minimum academic requirement, however, provides no assurance of admission. The number of applicants so qualified exceeds by a wide margin the number of places in the entering class and the scholastic standards of those admitted to the Faculty of Medicine in recent years have been considerably above this minimum required grade.

Persons who have been required to withdraw from another medical school for academic reasons are not eligible to apply.

Selection of Candidates for Admission

The first year entering class is presently limited to 120 full-time students. As noted above, the number of qualified applicants greatly exceeds this limit.

In the selection of the candidates to be granted admission the following guidelines are observed:

(1) No discrimination is made with respect to sex, race, religion, marital status, or economic status of the applicant.

(2) Preference is given to well-qualified residents of the Province of British Columbia.
(3) Selection of candidates for admission is made by a consensus of the Admissions Committee arrived at after independent rating of the applicants by individual members of the Committee. The rating assigned an applicant is based on the following criteria:
  (a) The candidate's total academic record since secondary school graduation. Apart from fulfilling the prerequisites referred to above it is the *total* performance in the student's academic program rather than the specific field of study, that is taken into account by the Admissions Committee. Considerable weight is placed on the candidate's overall average in all university courses completed to date, and on the average in the specific prerequisite courses listed above. Consideration is also given to performance in courses at senior undergraduate and graduate level, and to trends in grades from year to year.
  (b) Scores on the Medical College Admission Test.
  (c) Evaluation by at least three referees selected by the candidate and submitted under confidential cover.
  (d) Evaluation, by individual members of the Admissions Committee, of non-academic autobiographical material supplied by the applicant in the application documents.
  (e) Evaluations assigned on the basis of interviews of applicants by members of the Admissions Committee.
(4) Non-academic qualities to which special attention is paid include the following: motivation, maturity, integrity, emotional stability, realistic self-appraisal, social concern and responsibility, reliability, creativity, scientific and intellectual curiosity, attitude toward continuing learning, problem solving and decision-making aptitude, ability to communicate verbally and in writing, leadership potential, capacity to understand and cooperate with others, concern for human welfare, and demonstrated high level of performance in any aspect of human endeavour.

Selection of a Program of Premedical Studies

Students planning to apply for admission to the Faculty of Medicine should select their courses of study, in addition to the specific prerequisite courses listed above, to conform with the requirements of a baccalaureate degree program of their choice. It is considered desirable that students admitted to Medicine should come from a variety of premedical academic backgrounds, **and there is no particular degree program that is looked upon as having unique merits as preparation for the subsequent study and practice of medicine.**

In certain circumstances it may be in order for academically strong candidates who have completed programs of study that have not included all of the medical school prerequisites to enrol in a "qualifying" program in order to complete the entrance requirements.

Students who have completed programs that have included all of the prerequisites and who then enrol in "unclassified" non-degree programs for the sole purpose of improving their academic qualifications for admission to the Faculty of Medicine are advised that only a small proportion of candidates in these circumstances ultimately gain admission, and that a high level of academic performance in such an "unclassified" year will not necessarily result in acceptance into the Faculty of Medicine.

Application Procedure

Application blanks will be available in the Dean of Medicine's office from August 15 to January 15. Completed applications should be returned to that office as early as possible and in any case not later than *January 15, the deadline for receipt of applications*. It is the responsibility of the applicant to ensure that official transcripts covering all university or college courses completed to date are received in the Faculty of Medicine office not later than January 15.

A personal interview with members of the Admissions Committee may be required of any applicant.

University regulations require that a fee of $25.00 be charged for evaluating educational records issued by institutions outside the Province of British Columbia. This fee must accompany the application for admission form when submitted with supporting documents. This fee is non-refundable and is not applicable to tuition.

Notification to sucessful applicants will generally be issued by early July or in some instances by an earlier date.

An applicant who is successful must submit a deposit of $100.00 within four weeks of notification of the offer from this university. This deposit is non-refundable and shall be applied toward the tuition charge for the first term of the session for which the candidate has been accepted.

A successful applicant is required to submit a health record to the Student University Health Service at the time of acceptance. The approved form will be included in the registration package. Any false or inaccurate statement concerning the applicant's health could jeopardize his or her status as a student.

An applicant with any condition requiring periodic medical attention or interfering with normal activities must submit a medical certificate with the application. In this certificate the examining physician should describe the extent of the disability and estimate its effect upon the applicant's future ability to practise medicine.

Reapplications

Qualified candidates who are not admitted following initial application may reapply for admission in a subsequent year without prejudice. However, reapplications from candidates who have already applied unsuccessfully for admission to this Faculty on three previous occasions are not normally accepted.

Admission of Students by Transfer

The acceptance of transfer students will depend upon the existence of vacancies in the class year for which they are applying.

The student will only be considered if attending a medical school in Canada or in the United States that is accredited by the Committee on Accreditation of Canadian Medical Schools and the Liaison Committee on Medical Education.

Deferred Entry

Under some limited, special circumstances, admission may be deferred for one year at the discretion of the Admissions Selection Committee.

Combined B.Sc. degree and M.D. degree program

Students who have completed the third year in one of the approved degree programs of the Faculty of Science at U.B.C. and the first year in the Faculty of Medicine at U.B.C., and who have completed **ALL** the course requirements of the degree program may be eligible for the appropriate B.Sc. degree. It is necessary that such students meet all of the specific course requirements of the departmental degree program and have the prior approval of the Head of the Department. Students should plan to meet these *specific* course requirements prior to their entrance into the Faculty of Medicine. With the approval of the Dean of Science up to 15 units of course work in the Faculty of Medicine may be recognized for credit towards the B.Sc. degree.

Students in the Faculty of Medicine who wish to qualify for the B.Sc. degree must file a copy of their program in first year Medicine with the Dean of Science by September 15 of the Winter Session of the year preceding the Fall in which they plan to qualify for the B.Sc. degree.

Combined M.D. degree and Ph.D. degree program

This program is for the exceptional student who is contemplating an academic career in the Biomedical Sciences and who is prepared to accept a 6 or 7 year program. To be eligible, the student must have completed a B.Sc. degree with FIRST CLASS HONOURS (or equivalent), must be selected as a First Year medical student by the Faculty of Medicine, and must be accepted in a Ph.D. program sponsored by a Department of the Faculty of Medicine and approved by the Faculty of Graduate Studies.

The M.D.-Ph.D. student will normally be required to be registered as a graduate student for a minimum of 3 (12-month) years. During this period, the student will be permitted to take all the courses required for completion of the first year of Medicine. In addition, the student must complete all courses, seminars, directed readings and thesis work recommended by his/her Candidate's Committee in consultation with the department(s) concerned.

Upon successful completion of the graduate component of the program, the M.D.-Ph.D. candidate will be permitted to register in Second Year Medicine. The summer period between Second and Third Year Medicine, and the Basic Science elective in Third Year Medicine may be used by students to complete and defend his/her thesis.

Since the course work and the combined program can be expected to be heavy, the student is advised to arrange to begin the program in June rather than September of the first graduate student year.

A medical student who has a B.Sc. degree with first class honours and who has completed First Year Medicine with high standing is eligible for the M.D.-Ph.D. program. However a graduate student is not eligible for the combined program until he or she has been selected as a medical student by the Admissions Selection Committee of the Faculty of Medicine in the normal way.

Transfer of students from the Faculty of Graduate Studies to the Faculty of Medicine

Students enrolled in the Faculty of Graduate Studies are advised that only a small proportion of such students ultimately gain admission to the Faculty of Medicine. For this reason, students are discouraged from pursuing this course of action to gain admission to the Faculty of Medicine with advanced standing. Acceptance of such students into the Faculty of Medicine will be made through the existing selection procedures of the Faculty of Medicine as outlined above.

Registration

The academic year of the Faculty of Medicine normally begins on the first Tuesday after Labour Day for classes in the First, Second and Third Years. The academic term for Fourth Year begins early in May.

Students in each year of the medical course will be notified of the time and place for their registration. On the opening day of the new session, students must personally obtain registration cards and complete their registration procedure.

No student will be allowed to register after the first day of instruction in the term, nor will be admitted to any class after its first session, except by permission of the Dean.

Student Expenses

The following instruments and supplies will be required during the course; it is recommended that no purchases be made until details concerning the equipment required are furnished at the beginning of the courses by the departments concerned. (Prices based on 1985-86 costs.)

First Year:	**Approximate Price**
Microscope—an approved model	$500.00-$850.00
Instruments for anatomy and physiology	$15.00
Stethoscope	$50.00
Laboratory coats (4)	$80.00
Anatomy Laboratory fees	$30.00
Second Year	
Ophthalmoscope with otolaryngological attachments	$200.00
Sphygmomanometer	$90.00
Percussion Hammer	$14.00
Tuning Fork	$ 8.00

Textbooks

Information regarding textbooks will be given at the first class period in each course. Not less than $300.00 per year should be available for purchasing textbooks and expendable supplies.

Courses Leading to the M.D. Degree

The subjects in which instruction is given in the four academic sessions leading to the M.D. degree are as follows:

First Year:

Anatomy (including Embryology and Histology), Biochemistry, Physiology, Medical Microbiology, Parasitology, Introduction to Clinical Practice, and approved electives.

It is strongly recommended that the elective course in the History of the Health Sciences be taken by all students other than those taking special programs approved by the Faculty.

Second Year:

Introduction to Medicine, Introduction to Obstetrics, Introduction to Paediatrics, Introduction to Psychiatry, Introduction to Surgery, Medical Genetics, Medical Microbiology, Neuroanatomy, Neurophysiology, Health Care and Epidemiology, Pathology, Pharmacology, electives.

Third Year:

Medicine, Obstetrics and Gynaecology, Ophthalmology, Paediatrics, Psychiatry, Diagnostic Radiology, Pathology, Surgery (including sub-specialties), Anaesthesiology, and Basic Science electives.

Fourth Year (Clinical Clerkship):

Medicine, Obstetrics and Gynaecology, Paediatrics, Psychiatry, Surgery (including sub-specialties, Ophthalmology and Anaesthesiology), approved Electives.

Examinations and Advancement

Attendance

Regular attendance is expected of students in all their classes (including lectures, laboratories, tutorials, seminars, etc.). Students who are unavoidably absent because of illness or disability should report to their instructors on return to classes.

A student *planning* to be absent from classes *for any reason* must obtain previous permission from the Dean's office.

Examinations

Examinations in the Faculty of Medicine may be held at various times throughout the year. These examinations are obligatory for all students.

Should a student be unavoidably absent from a sessional or final examination because of illness or other reason, the Dean's office must be notified of the facts in the case before the end of the period during which the examination is scheduled. Failure to observe this rule may result in a failure being recorded in the course.

When a sessional or final examination has been missed through illness or some other justifiable cause, application for deferred examination or special consideration must be made in writing to the Dean not later than 48 hours after the close of the examination period. If the absence was for reasons of health, a physician's certificate indicating the nature and duration of the illness must be submitted to the University Health Service.

A student may be denied the privilege of writing a sessional examination in any subject because of unsatisfactory work or attendance, and in this case will be considered to have failed the course.

In any course which involves both laboratory work and written examinations, a student is required to achieve satisfactory standing in both parts of the course. If the course is repeated, no exemption will ordinarily be granted from the work in either part.

Term essays and examination papers may be refused a passing mark if they are illegible or noticeably defective in English.

The passing mark in the Faculty of Medicine is 60%. Examinations will be graded as follows: First Class, 80% or more; Second Class, 65-79%; Pass, 60-64%; Fail, below 60%.

All results of final examinations will be passed upon by a Promotions Committee. Final examination results will be released by the Registrar.

Advancement

The Faculty will determine the student's fitness for promotion at the end of each session.

A student whose academic standing is unsatisfactory may be required either to withdraw from the Faculty or to repeat the entire work of the year.

If the progress of a student has been unsatisfactory in any given session, the Faculty may permit a supplemental examination in the subject failed, provided that: (i) attendance has been satisfactory; (ii) more than two subjects have not been failed; and (iii) an average of at least 60% in the work of the year including the failed subjects has been obtained. The department or departments concerned may direct such work as will be necessary to prepare for the supplemental examination. It is the responsibility of the student to consult the heads of the departments concerned about such arrangements. If the student satisfies the requirements of the departments concerned and passes each supplemental examination with a mark of at least 65% he or she will be promoted.

A student in the first year who fails to be promoted will not be permitted to repeat the year except under special circumstances.

A student will not be permitted to repeat more than one year except under special circumstances.

A student who repeats a year is required to attain a mark of at least 65% in the examination in each subject.

Although satisfactory academic performance is prerequisite to advancement it is not the sole criterion in the consideration of the suitability of a student for promotion or graduation. The Faculty reserves the right to require a student to withdraw from the Faculty if considered to be unsuited to proceed with the study or practice of medicine.

Subjects of the Final Examinations

First Year:

Anatomy (including Radiological Anatomy), Histology (including Embryology), Biochemistry, Physiology, Parasitology.

Second Year:

Anatomy (Neuroanatomy), Medicine, Paediatrics, Obstetrics, Psychiatry, Medical Microbiology, Pathology, Pharmacology, Physiology (Neurophysiology), Medical Genetics.

Third Year:

Promotion of students from Third Year to Fourth Year will be based on a continuing evaluation carried out by each Department during the Third Year and on results of written examinations and clinical oral examinations.

The subjects in which students will be assessed in Third Year will be: Anaesthesiology; Basic Science electives; Medicine; Obstetrics and Gynaecology; Opthalmology; Paediatrics; Psychiatry; and Surgery. Students will also be required to demonstrate satisfactory knowledge of radiological aspects of the above listed subjects.

Fourth Year (Medical Student Internship):

Medicine, Obstetrics and Gynaecology, Paediatrics, Psychiatry, and Surgery, (including subspecialties).

All persons writing the Medical Council of Canada examinations are required to submit a separate examination fee to that body. This fee is set by the Council and is payable to The Registrar, Medical Council of Canada.

Enabling Certificates

An Enabling Certificate is required for admission to the examinations of the Medical Council of Canada. This certificate is obtained from the provincial College of Physicians and Surgeons through the Dean's office at the Vancouver General Hospital.

If a student plans to practise in British Columbia he/she should make application to the Registrar, College of Physicians and Surgeons of British Columbia, to receive the required Enabling Certificate. Application should be made not *later than February 1* in the final year of the medical course. Forms will be made available in the Dean's office, Vancouver General Hospital.

A student planning to practise medicine outside this province should comply with the regulations of the appropriate licensing body, including the requirements of other Colleges of Physicians and Surgeons.

A student who has registered in another province should ordinarily obtain the Enabling Certificate from that province.

Requirements for the Degree of M.D.

A candidate for the M.D. degree must be at least twenty-one years of age; have fulfilled all the requirements for entrance to the Faculty of Medicine and have attended the four full years of instruction which comprise the medical course. No one will be admitted to candidacy for the M.D. degree who has not been in attendance for the final two years in the Faculty of Medicine at the University of British Columbia.

Each candidate for graduation must have passed all the required examinations in the subjects comprising the medical course, and have received acceptable ratings in certain courses for which satisfactory completion is required but specific marks are not assigned.

The Faculty will recommend to Senate the granting of the M.D. degree to a student who has completed satisfactorily the academic requirements.

Each candidate for the M.D. degree must make formal application, on a form obtainable at the Registrar's office.

Regulations Regarding Licence to Practise Medicine

The possession of an M.D. degree does not, in itself, confer the right to practise medicine in any province in Canada. Each province has a College of Physicians and Surgeons, as mentioned previously, and these Colleges have the final authority to grant a licence to practise medicine within their jurisdictions. The possession of the Licentiate of the Medical Council of Canada (L.M.C.C.) is one of the major requirements of the Provincial Colleges of Physicians and Surgeons for registration.

In British Columbia, the College of Physicians and Surgeons requires that applicants must complete a minimum of 6 weeks of post-graduate training in each of medicine, surgery, obstetrics and gynaecology, and paediatrics in an approved hospital in addition to holding the Licentiate of the Medical Council of Canada before they become eligible for a licence to practise. This requirement is waived in the event that an applicant has obtained specialty qualification of the Royal College of Physicians and Surgeons of Canada, and does not apply to resident staff appointments during tenure of such appointments.

Post-graduate Education

All medical graduates must undertake at least one year of postgraduate medical education in an accredited hospital in Canada or the United States or an approved equivalent in order to obtain a licence to practice, even if they plan a career which does not involve the care of patients. Basic medical education is not considered complete without this educational experience. This may be undertaken (i) as a rotating internship, (ii) as a first year of training in Family Practice with the object of completing the two necessary years of training and obtaining certification by the College of Family Physicians of Canada or (iii) as a straight internship in a specialty ultimately leading to a specialty qualification of the Royal College of Physicians and Surgeons of Canada. The straight internship must be preceded by an acceptable medical student internship and must be taken in a resident training program which is approved for full training in the specialty concerned.

The Faculty of Medicine assists in arranging for postgraduate positions and advises on the merits of those available. The Office of the Associate Dean, Undergraduate Medical Program, should be consulted early in the final year (Phase IV) before students apply to the hospitals in which they are interested, as not all programs are acceptable.

It should be clearly understood that the Faculty of Medicine does not undertake postgraduate placement or the assignment of graduating students to postgraduate positions. The Canadian Intern Matching Service, Association of Canadian Medical Colleges, provides a matching service program for internships and the first year of Family Practice training in Canada.

The Canadian Intern Matching Service (CIMS)

Virtually all hospitals accredited for intern training in Canada are members of the Canadian Intern Matching Service and all graduates from Canadian medical schools who plan to take their first postgraduate year in Canada must apply through this organization.

The Matching Service is a clearing-house designed to help final year students obtain the internships of their choice, and to help hospitals and internship program directors obtain the students of their choice.

The Matching Service acts as the student's agent on the instructions embodied in the student's confidential list of all the internships for which he or she has applied, ranked in order of preference. Similarly, the Matching Service acts as the hospital's agent on the instructions embodied in its confidential list of all the students that have applied, ranked in order of the hospital's preference.

The CIMS brochure and relevant documents for participation in the matching program are distributed annually in June to all final year medical students through the Dean's Office at Vancouver General Hospital. Further information is available from the CIMS office, c/o ACMC, 151 Slater Street, Ottawa, K1P-5H3, Ontario (telephone 613-237-0070).

Resident Education

Specialty training is ordinarily commenced as a straight internship or following a rotating internship, and is acceptable only if taken in institutions which are approved by the Royal College of Physicians and Surgeons of Canada. Such approval is now limited to specialty training programs which are sponsored, organized, and directed by a University medical school. All residents are appointed by the British Columbia Interns and Residents Paying Agency and the University of British Columbia. All residents are required to register as postgraduate (resident) students of the University in order to receive accreditation for their training. Postgraduate courses are offered by individual departments or divisions of the Faculty of Medicine to members of the resident staff of these hospitals. These courses conform to the specialty training requirements of the Royal College of Physicians and Surgeons of Canada and are listed under calendar numbers 700 or higher.

Applications for resident staff appointments by graduates of Canadian and U.S. Medical Schools approved by the Liaison Committee on Medical Education should be made to the Program Director of the appropriate division or department of the University. Applications from graduates of foreign medical schools should be addressed to the Associate Dean, Residency Training.

Division of Continuing Medical Education

A Division of Continuing Medical Education has been established within the Office of the Dean. Its purposes are to: initiate and support programs in continuing medical education for physicians in practice, initiate and support health sciences interprofessional programs of continuing education, initiate and support efforts designed to define needs in continuing medical education, initiate and support programs of evaluation in continuing medical education, initiate and support experiments in new methods of learning in undergraduate and continuing medical education, and improve methods of information dispersal in continuing medical education leading to improved patient care.

Courses of Instruction

Departmental and interdepartmental courses offered by the Faculty of Medicine are listed in detail in the section of the university calendar headed "Course of Instruction."

Electives

Information concerning elective offerings may be obtained from the office of the Dean. In addition to formal courses offered by the Faculty of Medicine elective programs arranged by the student may be permissible in individual cases, subject to approval by the Faculty.

2. POSTGRADUATE (RESIDENCY) TRAINING PROGRAMS

Postgraduate Courses

Postgraduate courses are offered by individual departments or divisions of the Faculty of Medicine, to members of the Resident Staff of University-affiliated institutions. These courses satisfy the specialty training requirements of the Royal College of Physicians and Surgeons of Canada and are approved as a prerequisite for the examinations in each specialty. All Residents must register as Postgraduate (Resident) students of the University.

The Royal College of Physicians and Surgeons of Canada requires a minimum of four to five years of specialty training dependent on the individual specialty. The rotating internship year is not accepted as a year of training, however it is a prerequisite to entry into most programs. Ongoing assessments are made through each of the training years and, on satisfactory completion of the program, candidates may apply to sit the certification examination of the Royal College of Physicians and Surgeons of Canada.

The first year of residency in Family Practice fulfils the mimimum licensing requirements of the College of Physicians and Surgeons of British Columbia, however two years of Family Practice training is required for the resident to sit the certification examinations of the College of Family Physicians of Canada.

Supervision of each training program is the responsibility of the university department or division concerned. Selection of candidates for each program is at the discretion of the Program Director of each department to whom application should be made.

The training programs run throughout the calendar year, commencing July 1. A variety of service rounds, conferences and seminars, small group tutorials, and divisional sessions having a bearing on patient care, but within which a teaching component is clearly defined, are offered.

For course descriptions see calendar section "Courses of Instruction," under the appropriate heading.

Anaesthesiology

The postgraduate program in anaesthesiology, which is fully approved for Certification and Fellowship in the Royal College of Physicians and Surgeons of Canada provides rotations in clinical Anaesthesia, Internal Medicine and Basic Science or Clinical Research.

The two or three year clinical rotations of the four year program involve a wide experience in all of the subspecialties of clinical anaesthesia, including periods in Intensive Care Units, Pain Clinics and Hyperbaric Medicine. The resident is introduced to clinical responsibility in a graded manner, with the objective of becoming a consultant in anaesthesia in its broadest sense. An active academic core of Junior (first year resident) and Senior (final two years) Tutorials, Seminars, Clinical Anaesthesia and Intensive Care Unit Rounds, Clinical Workshops, and Journal Clubs (see course of instruction for details) are held weekly throughout the academic year. Clinical and academic evaluations are conducted on a day to day basis, as well as with formal written and oral examinations, held twice annually. The year of Internal Medicine emphasizes cardiovascular and respiratory aspects, but options are available as outlined in the Royal College of Canada Approved Programs.

The fourth and final year may involve a third year of clinical anaesthesia specialty rotations or a research and teaching fellowship in Physiology and Pharmacology or clinical research fellowship in Anaesthesia at one of the several university affiliated teaching hospitals.

Diagnostic Radiology

The postgraduate program in Diagnostic Radiology is fully approved for Certification and Fellowship in the Royal College of Physicians and Surgeons of Canada. This three year program starts with one year core training in chest radiology, gastrointestinal radiology, genitourinary radiology, paediatric radiology, neuroradiology and radiology of bone and joints. The second and third years of training again include general radiology but also special training in ultrasound, angiography, oncologic radiology, computed tomography, and interventional radiology.

Experience in Emergencies is obtained on rotation during evenings, weekends and holidays in the second and third years. Current literature in Diagnostic Radiology and related specialties is reviewed. The training program commences on July 1, daily seminars continue throughout the year, major conferences are given during the academic year. Usually, about six internationally known Radiologists visit the Department for a one week period for lectures and seminars.

Family Practice

The Family Practice Residency is a two-year program in which the Resident is given progressively increasing responsibility in patient care and management. Residents receive training in various hospitals in Medicine, Surgery, Paediatrics, Obstetrics and Gynaecology, Emergency and Psychiatry. In addition, within the Family Practice Units and in community practices, they are involved directly with ambulatory patients to whom they relate as family physicians and provide primary care on an episodic, continuing and preventative basis under the supervision of Department of Family Practice Staff physicians. Patients are seen and patient problems managed in office, home and hospital environments. Formal rounds, seminars, tutorials, daily chart rounds and Journal Clubs round out the resident's training in areas particularly pertinent to Family Practice.

Geriatric Medicine

The objective of this program is to provide two years of training in Geriatric Medicine for graduate physicians interested in a career in Geriatric Medicine. The program has been designed to meet the guidelines of the Royal College of Physicians and Surgeons of Canada.

Prerequisite for entry into the program is the completion of three core years of training in Internal Medicine in a program approved by the Royal College of Physicians and Surgeons of Canada. The training program of two years will consist of six months experience on the Geriatric Short Stay Assessment and Treatment Centre at Shaughnessy Hospital, six months on the Geriatric Medicine Consulting Service at Shaughnessy Hospital, two months in Geriatric Psychiatry at the Vancouver General Hospital and a continuous assignment for one year on the Long Term Care Unit at Shaughnessy Hospital or the Health Sciences Centre Hospital. The remainder of the program will consist of selected training on some of the following services: Neurology and Rehabilitation Medicine at Shaughnessy Hospital, the Acute Care Geriatric Unit at St. Paul's Hospital, the Geriatric Short Stay Assessment and Treatment Centre at Mount St. Joseph's Hospital, the Alzheimer Clinic at the Health Sciences Centre Hospital, or other experiences where appropriate. The Program Director will be Dr. B. Lynn Beattie, with the Department of Medicine being responsible for the program.

The quality of the program will be audited by annual reviews by the Training Program Committee, with a Faculty review at two year intervals by the Faculty Residency Committee as well as by the Royal College of Physicians and Surgeons site visit every five to six years.

On completion of the program trainees will be expected to complete the Royal College of Physicians and Surgeons examination for a Certificate of Special Competence in Geriatric Medicine.

Health Care and Epidemiology

Post-graduate training in Community Medicine consists of three years in an accredited Community Medicine training program, with one optional year in another approved program or a fourth year in the program. The first of the three years consists of an academic year in the Department of Health Care and Epidemiology, where the resident becomes familiar with the sciences basic to Community Medicine, such as biostatistics, epidemiology, toxicology, occupational health and community health programs. Upon completion of the academic year an M.H.Sc. will be conferred. The two further years consist of increasing responsibility in the areas of clinical epidemiology, occupational and environmental health and community medicine. Research experience is encouraged as a component of the program. Rotations may be in industry or health units in B.C. Rounds and seminars are held regularly in the department on campus once a week. Resident attendance is encouraged except for distant field placements.

Medical Microbiology

The purpose of this residency program is to train physicians to a level of competence that will enable them to direct the microbiology services in any hospital or other health care facility. Emphasis is placed on the appropriate delivery of diagnostic tests, infection control and consultation services to clinical colleagues who look after patients with infection. It is a four-year program comprising two core years of medical microbiology, and one year in an elective program approved by the director.

Medicine

The training program includes ward work and case conferences on General Medical and Subspecialty Ward Services supervised by members of the Faculty. The Residents are given progressive responsibility for patient care on Medical Wards. Investigation and management of disease in ambulatory patients is provided under the direction of Faculty Members in the General Internal Medicine and Medical Specialties.

The Department of Medicine utilizes the following facilities. The Vancouver General Hospital, St. Paul's Hospital, Shaughnessy Hospital and the W. Koerner Acute Care Unit of the Health Sciences Hospital. The Department also utilizes the facilities of the Maxwell Evans Cancer Control Agency, the G. F. Strong Rehabilitation Center, and the Arthritis Center.

In the Department of Medicine and its Subspecialties, courses will be given as indicated in the calendar section "Courses of Instruction." At present the following have training programs, in addition to courses listed.

General Internal Medicine
Cardiology
Dermatology
Endocrinology
Gastroenterology
Geriatrics
Haematology
Infectious Disease
Nephrology
Neurology
Oncology
Physical Medicine and Rehabilitation
Respiratory Diseases
Rheumatology

Nephrology

The objectives of the program in Nephrology are to provide training for individuals interested in clinical practice in Nephrology as well as those interested in an academic career in the discipline.

Prerequisites for entry into the program are the successful completion of three core years of residency training in internal medicine. The two years of training will consist of a first year in which eight months will be spent at the Vancouver General Hospital and four months at St. Paul's Hospital in training in clinical Nephrology including experience in peritoneal dialysis, haemodyalysis, transplantation techniques and general clinical nephrology. The second year of the program is a more flexible year which may be devoted to research or to enhancing skills and knowledge in certain areas of nephrology. The facilities which will be employed in the program include the Vancouver General Hospital, St. Paul's Hospital and the Acute Care Unit of the Health Sciences Centre.

Nuclear Medicine

The objectives of this program are to provide two years training in Nuclear Medicine for graduate physicians interested in a career in nuclear medicine in a community hospital or in an academic centre.

Prerequisite for entry into the program is the successful completion of at least one year of training in diagnostic radiology, internal medicine, paediatrics or other specialty approved by the Royal College of Physicians and Surgeons as a component of training of nuclear medicine.

The training program of two years will consist of three to six months experiences in the division of nuclear medicine at the Vancouver General Hospital, St. Paul's Hospital, Children's Hospital and the Health Sciences Centre Hospital. For individuals interested in an academic career, excellent research resources are available in

all of the diagnostic imaging techniques including an extensive radiopharmaceutical preparation and research laboratory, an active research program into medically useful nuclides at TRIUMF, and positron emission tomography and single photon emission tomography facilities as well as other modalities such as nuclear magnetic resonance, ultrasound and computer assisted tomography.

Obstetrics and Gynaecology

A balanced program of academic and practical clinical experience. The academic program consists mainly of weekly specialty rounds in the areas of gynaecology, gynaecologic oncology, high-risk pregnancy and fetal monitoring. Current cases and unusual clinical problems, together with their pathophysiology and management are discussed. A weekly afternoon seminar is held in which topics are assigned and prepared by residents and attending staff. Selected papers from the current literature are presented and critically discussed by the residents and the attending staff. Clinical experience is provided under supervision in the Ambulatory Care Clinics with graduated responsibility being provided in the performance of operating and case room procedures.

Ophthalmology

The Department offers practical experience in examination, investigation and management of patients in the neuro-ophthalmology, retina, cornea glaucoma, refraction and contact lens, ocular plastic, genetic and low vision clinics under supervision in addition to general ophthalmology and paediatric ocular motility clinics throughout the week. Instruction and assistance is given in the practical performance of major and minor ophthalmic surgical procedures. The management of patients with emphasis on solving diagnostic problems and performance of medical and surgical therapy is undertaken on both an in-patient and out-patient basis with follow-up clinics.

Paediatrics

Experience is obtained in the diagnosis and management of paediatric patients in the wards including technical procedures in the fields of general paediatrics, neonatology, haematology, nephrology, neurology, cardiology, infectious disease and other specialties on a daily basis under the supervision of the paediatric staff. There are daily rounds and several weekly sessions. Junior Residents rotate through the out-patient department, paediatric surgery and a residential school for mentally retarded children. Recent paediatric literature is reviewed and published papers are critically discussed at periodic intervals.

Pathology

Approved training is available in all of the subspecialties of laboratory medicine which can be designed to fulful the requirements of a general or specialized pathology postgraduate program. Residents will normally rotate through the major teaching hospitals and are expected to assume increasing responsibilities as they progress. Weekly seminars are held as well as reviews of interesting cases.

Psychiatry

The training experience of the residents in the Department of Psychiatry is diverse. It includes inpatient and outpatient experience, emergency psychiatry, liaison psychiatry and child psychiatry.

There are opportunities for learning the various psychotherapies, psychopharmacology, social and community psychiatry and research. One day per week is devoted to guest lectures and departmental seminars. Each participating hospital has its own grand rounds and case conferences.

Surgery

Bedside Clinics for the discussion of problem cases are held regularly, including regular ward rounds and out-patient clinics. Progressive responsibility in patient care, operative instruction and experience, are given in each discipline.

The Department of Surgery has approved specialty training programs in the following specialties:

Cardio-Vascular and Thoracic Surgery
General Surgery (including vascular surgery)
Neurosurgery
Orthopedics
Otorhinolaryngology
Plastic Surgery
Urology.

Radiation Oncology (Cancer Control Agency of British Columbia)

Residents rotate through the various clinical teams in Radiation Oncology. On each service they receive personal supervision for the ward management of patients and practical experience in the planning and delivery of radiation therapy.

The Residents take part in joint interdisciplinary conferences in the management of breast, gynaecological, genitourinary, gastrointestinal, lymphomatous, head and neck, dermatological, thoracic and paediatric malignancies. There are various teaching rounds and formal lectures and seminars in basic physics, radiobiology, radiation oncology and general oncology.

3. BACHELOR OF MEDICAL LABORATORY SCIENCE (B.M.L.Sc.) DEGREE

This degree is granted upon the successful completion of a two-year course.

The course consists of training in the theory and practice of Medical Laboratory Science with courses in human pathology, modern microscopy, normal human histology, haematology, medical microbiology, clinical chemistry, nuclear medicine for medical laboratory scientists, immunopathology and laboratory administration in addition to the general application of basic science to the clinical disciplines of medical laboratory science.

Admission Requirements

Applicants must meet the general admission requirements of the University. The Department of Pathology reserves the right of selection of all students admitted to this degree program.

Candidates for admission must have graduated from an approved Institute of Technology (or College) with an approved two year program in Medical Laboratory Technology, plus one year of in-hospital training in a C.M.A. approved hospital laboratory. They must have graduated with the Canadian Society of Laboratory Technologists R.T. (general) diploma. They must, in addition, have passed English 100 (or equivalent) **OR** the English Composition Test and gained credit in one of options (a) or (b):

(a) Chemistry 230 (or its equivalent) plus one of Chemistry 205, Chemistry 201 or any other second year level physical chemistry course.
(b) Chemistry 230 (or its equivalent) and 3 units of arts electives.

Candidates admitted under obtion (b) must complete Chemistry 205 in the first year of the program.

Applications from suitably qualified Science students will be considered. Enquiries should be directed to the Department of Pathology, tel. 228-7093 or 228-7108.

Application and Registration

All enquiries relating to admission should be addressed to:

B.M.L.Sc. Coordinator,
Department of Academic Pathology
Ground Floor, Room 227
Acute Care Hospital
2211 Wesbrook Mall
The University of British Columbia,
Vancouver, B.C. V6T 1W5

PROGRAM

Third Year

Instrumental Analysis	CHEM	311
Bacteriology, Mycology, Virology and Parasitology	PATH	427
Introduction to Medical Laboratory Science	PATH	301
Laboratory Administration	PATH	302
Principles of Tissue Culture, etc.	PATH	303
Normal Human Histology	PATH	304
Modern Microscopy	PATH	305
Introduction to Human Pathology	PATH	375
An Arts elective		

Fourth Year

Statistics in the Health Sciences	HCEP	400
Clinical Chemistry	PATH	406
Analytical, Clinical and Forensic Toxicology	PATH	407
Haematology	PATH	402
Nuclear Medicine for M.L.Sc.	PATH	403
Histochemistry	PATH	404
Immunopathology	PATH	525
Seminars in Current Topics	PATH	405
An Arts elective		

AWARDS AND FINANCIAL ASSISTANCE

A supplement to this Calendar entitled "Awards and Financial Aid" contains a list of current academic awards (scholarships, prizes, etc.) and available financial assistance (grants, bursaries and loans). Students are encouraged to consult the above section to determine awards for which they may be eligible. For further information and application forms contact the Awards Office, 50 General Services Administration Building, The University of British Columbia, 2075 Wesbrook Mall, Vancouver, British Columbia. V6T 1W5. (Telephone 228-5111).

THE SCHOOL OF NURSING

(A School within the Faculty of Applied Science)

ACADEMIC STAFF

MARILYN D. WILLMAN, B.S.N. (Michigan), M.S.N., Ph.D. (Texas), R.N., Professor and Director of the School.
MARGARET A. CAMPBELL, B.A., B.A.Sc. (Brit. Col.), M.S. (Western Reserve), Ed.D. (Columbia), R.N., Professor.
JOAN M. ANDERSON, B.N. (McGill), M.S.N., Ph.D. (Brit. Col.), R.N., Associate Professor.
HELEN ELFERT, B.N. (McGill), M.A. (New York), R.N., Associate Professor.
KIRSTEN HYDE, B.N. (McGill), M.S. (Calif., S.F.), R.N., Associate Professor.
LINDA G. LEONARD, B.S.N., M.S.N. (Brit. Col.), R.N., Associate Professor.
T. ROSE MURAKAMI, B.S.N. (Brit. Col.), M.Sc.(A) (McGill), M.S. (Rehab. Nsg.) (Boston), R.N., Associate Professor and Vice President, Nursing, H.S.C. Hospital.
HELEN NISKALA, B.N. (McGill), M.S.N. (Calif., S.F.), Ed.D. (Brit. Col.), R.N., Associate Professor.
HELEN L. SHORE, B.S.N., M.A. (Brit. Col.), R.N., Associate Professor.
SHEILA M. STANTON, B.Sc.N. (Windsor), M.Sc.N. (Western Ontario), R.N., Associate Professor.
ADA BUTLER, B.A.Sc., M.S.N. (Brit. Col.), R.N., Assistant Professor.
ELAINE A. CARTY, B.N. (New Brunswick), M.S.N. (Yale), R.N., Assistant Professor.
JOANNE CHEKRYN, B.N. (Manitoba), M.N. (Washington), R.N., Assistant Professor.
MARILYN E. DEWIS, B.S.N. (Toronto), M.Ed. (Ottawa), R.N., Assistant Professor.
M. RUTH ELLIOTT, B.Sc. (Alberta), M.Sc. (Calif., S.F.), R.N., Assistant Professor.
DONELDA J. ELLIS, B.Sc.N. (Western Ontario), M.S.N. (Brit. Col.), R.N., Assistant Professor.
JANET M. GORMICK, B.S. (Syracuse), M.N. (Calif., L.A.), R.N., Assistant Professor.
CLARISSA P. GREEN, B.S.N. (Florida), M.S.N. (Calif., L.A.), R.N., Assistant Professor.
VIRGINIA E. HAYES, B.Sc.N. (Windsor), M.N. (Dalhousie), R.N., Assistant Professor.
ROBERTA J. HEWAT, B.S.N., M.S.N. (Brit. Col.), R.N., Assistant Professor.
BARBARA ANN HILTON, B.S.N. (Brit. Col.), M.S.N. (Toronto), R.N., Assistant Professor.
SYLVIA HOLMES, B.Sc.N. (Alberta), M.Sc.(A) (McGill), R.N., Assistant Professor.
CAROL JILLINGS, B.S. (San Francisco), M.S.N. (Brit. Col.), R.N., Assistant Professor.
GLORIA JOACHIM, B.S.N. (Maryland), M.S.N. (Brit. Col.), R.N., Assistant Professor.
ELIZABETH S. JOHNSON, B.S.N. (Calif. State), M.S.N. (Calif., L.A.), R.N., Assistant Professor.
GARY D. JOHNSON, B.Sc. (Stanford), B.Sc.N., M.Sc.N. (Portland), M.A., Ph.D. (Calif., L.A.), R.N., Assistant Professor.
JUDY LYNAM, B.N. (McGill), M.S.N. (Brit. Col.), R.N., Assistant Professor.
BARBARA MILNE, B.Sc.N., M.Sc.N. (Toronto), R.N., Assistant Professor.
JUDITH MOGAN, B.Sc.N. (Toronto), M.A. (Brit. Col.), Assistant Professor.
JO-ANN PERRY, B.S. (Adelphi, N.Y.), M.S.N. (Brit. Col.), R.N., Assistant Professor.
JANE ALISON RICE, B.S.N. (Brit. Col.), M.S. (Calif., S.F.), R.N., Assistant Professor.
CAROLE A. ROBINSON, B.Sc., B.Sc.N. (Alberta), M.S.N. (Brit. Col.), R.N., Assistant Professor.
LINDA ROSE, B.N. (Dalhousie), M.S.N. (Brit. Col.), R.N., Assistant Professor.
KATHLEEN SIMPSON, B.Sc.N. (Alberta), M.S.N. (Calif., S.F.), Ed.D. (San Francisco), R.N., Assistant Professor.
OLIVE SIMPSON, B.Sc.N., M.Ed. (Ottawa), R.N., Assistant Professor and Project Director, Baccalaureate Outreach Program.
MARGARET A. SMITH, B.S.N. (Calif., Sacramento), M.N. (Washington), R.N., Assistant Professor.
RAYMOND M. THOMPSON, B.Sc.N., M.Sc.N. (Western Ontario), R.N., Assistant Professor.
SALLY A. THORNE, B.S.N., M.S.N. (Brit. Col.), R.N., Assistant Professor.
PATRICIA E. VALENTINE, B.S.N. (Brit. Col.), M.A. (Calgary), R.N., Assistant Professor.
ETHEL M. WARBINEK, B.S.N., M.S.N. (Brit. Col.), R.N., Assistant Professor.
M. ANNE WYNESS, B.S.N. (Brit. Col.), M.N. (Washington), R.N., Assistant Professor.
JANET ERICKSEN, B.S.N. (Illinois), M.A. (N.Y.U.), R.N., Senior Instructor.
MARY V. REGESTER, B.S., M.P.H., (Columbia), R.N., Senior Instructor.
JOANNE RICCI, B.S.N., M.S.N. (Brit. Col.), R.N., Senior Instructor.
LOUISE TENN, B.Sc.N. (Ottawa), M.Ed. (Montreal), R.N., Senior Instructor.
CONNIE CANAM, B.N. (Dalhousie), M.S.N. (Brit. Col.), R.N., Instructor.
JENNIFER L. CHUNG, B.S.N. (Brit. Col.), M.N. (Wash.), R.N., Instructor.
MARGARET E. KLINGER, B.S.N. (Brit. Col.), M.Sc.N. (Toronto), R.N., Instructor.
KATHERINE I. McINDOE, B.S.N., M.S.N. (Brit. Col.), R.N., Instructor.
SHELAGH J. SMITH, B.A.Sc., M.S.N. (Brit. Col.), R.N., Instructor.
SHIRLEY W. STEPHENS, B.S.N. (Sask.), M.Ed. (Brit. Col.), R.N., Instructor.
GAIL BEDDOME, B.S.N. (Brit. Col.), R.N., Lecturer.
JENISE BROUSE, B.S.N., M.S.N. (Brit. Col.), R.N., Lecturer.
JOANN COZAC, B.S.N. (Sask.), M.S.N. (Brit. Col.), R.N., Lecturer.
LINDA ANN KISS, B.S.N., M.S.N. (Brit. Col.), R.N., Lecturer.
RUTH LAMB, B.A., M.S.N. (Brit. Col.), R.N., Lecturer.
KATHLEEN MAIR, B.S.N. (Brit. Col.), R.N., Lecturer.
VALERIE ROGERS, B.S.N. (Brit. Col.), R.N., Lecturer.
MAUREEN M. SEXSMITH, B.S.N. (Calgary), R.N., Lecturer.
SHEILA STICKNEY, B.S.N. (Brit. Col.), R.N., Lecturer.
PAULETTE TOMASSON, B.S.N. (Sask.), M.A. (Antioch), R.N., Lecturer.

Adjunct Professors
ANN-SHIRLEY GOODELL, B.S.N. (Brit. Col.), M.S. (Ohio State), R.N., Director of Nursing, Children's Hospital.
INGE SCHAMBORZKI, B.N., M.Sc.(A) (McGill), R.N., Vice-President Nursing, Vancouver General Hospital.

Clinical Associates
ROSALIE STARZOMSKI, B.N. (Dalhousie), M.N. (Calgary), R.N., Clinical Assistant Professor.

Clinical Staff in Associated Agencies:
Burnaby General Hospital.
Cancer Control Agency of B.C.
Children's Hospital.
Family Practice Units — U.B.C., V.G.H.
Grace Hospital, Vancouver.
G.F. Strong Rehabilitation Centre, Vancouver.
Health Sciences Centre Hospital, Acute Care Unit.
Health Sciences Centre Hospital, Extended Care Unit.
Health Sciences Centre Hospital, Psychiatric Unit.
Holy Family Hospital.
Kensington Hospital.
Lions Gate Hospital.
Louis Brier Hospital.
Mount St. Joseph Hospital.
North Shore Health Department.
Pearson Hospital.
Provincial Health Department — Boundary Health Unit, Simon Fraser Health Unit and Central Fraser Valley Health Unit.
Queens Park Hospital.
Richmond General Hospital.
Richmond Health Department.
Royal Columbian Hospital, New Westminster.
St. Paul's Hospital, Vancouver.
Shaughnessy Hospital, Vancouver.
U.B.C. Day Care Centres.
Valleyview Hospital.
Vancouver City Health Department.
Vancouver General Hospital.

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SCHOOL OF NURSING

Programs offered:

Baccalaureate Program

(a) For secondary school graduates—a four-year program leading to the degree of Bachelor of Science in Nursing (B.S.N.).

(b) For registered nurses—a two-year program leading to the degree of Bachelor of Science in Nursing (B.S.N.).

Master's Program

For baccalaureate graduates—a two-year program leading to the degree of Master of Science in Nursing (M.S.N.).

Continuing Nursing Education

For practicing nurses—a variety of non-credit courses.

PHILOSOPHY

The faculty of the School of Nursing believe that the unique function of nursing is to nurture individuals during critical periods of the life cycle so that they may develop and utilize a range of coping behaviors which permit them to satisfy their basic human needs and thereby move toward optimal health. The nurse makes this unique contribution as a member of the team of health professions whose ultimate goal is the optimal health of mankind.

The faculty have set forth more explicit statements of beliefs about nursing, preparation for nursing, students, faculty, expansion and dissemination of nursing knowledge and leadership. These are available to all applicants to the School and upon request.

Objectives of the Baccalaureate and Master's programs which follow set forth the specific qualifications graduates are expected to possess and the professional roles they are prepared to fill.

In support of the belief that the pursuit of continued learning is a responsibility of the professional nurse, the School assumes as a major function the provision of continuing education in nursing.

BACCALAUREATE PROGRAM

The Program

For secondary school graduates without registered nurse preparation, the B.S.N. program is four years in length.

Registered nurses who have completed a diploma nursing program in a hospital school of nursing or community college may apply for admission to the baccalaureate program. If eligible for admission to the University and the B.S.N. program, these candidates are admitted to the third year of the program.

Students who complete the baccalaureate program and earn the B.S.N. degree are prepared to provide nursing care to both individuals and families, to people of all ages, in any stage of health or illness, working interdependently with other health professionals in primary care settings as well as in acute and long-term settings.

Goals of the Baccalaureate Program

The graduate will practice professional nursing in a variety of settings with individuals, families and other groups of all ages and will demonstrate the following behaviors:

Foundation for Professional Nursing Practice:

1. Applies knowledge from the arts and humanities to the practice of nursing.
2. Utilizes knowledge from the physical, biological and behavioral sciences in planning and implementing nursing care.
3. Uses scientific methods of inquiry in arriving at professional judgments.
4. Applies knowledge of man as a behavioral system and as a system in interaction with individuals and groups.

Professional Nursing Practice:

1. Functions independently and interdependently in providing nursing care.
2. Assesses the health status of the client(s) and determines the need for nursing care.
3. Plans and intervenes purposefully to assist the client in attaining, maintaining or regaining health, or to a peaceful death.
4. Evaluates nursing interventions on the basis of established goals.
5. Communicates effectively with clients and colleagues.
6. Applies principles of learning and teaching in individual and group situations.
7. Applies research findings to improve nursing care.
8. Utilizes management principles in providing, directing and evaluating health care implemented by self and others.
9. Demonstrates the capacity for assuming a leadership role.
10. Collaborates with other members of the health professions in promoting and restoring the health of individuals, families and community.
11. Practices nursing within a framework of safe, legal, ethical and professional standards.
12. Accepts responsibility and accountability for own nursing actions.
13. Accepts responsibility for self-directed, continuous, personal and professional growth.
14. Evaluates the present and emerging roles of the professional nurse in relation to the trends in health care.
15. Develops commitment to the goals of the profession and utilizes these goals as motivation for professional activity.

ADMISSION REQUIREMENTS

General

All inquiries relating to admission to the School of Nursing should be addressed to: The University of British Columbia, Office of The Registrar, 204-2075 Wesbrook Mall, University Campus, Vancouver, B.C. V6T 1Z2. Requests for application forms should specify the particular program in which the applicant is interested.

Additional information for registered nurses may be obtained from the School of Nursing, T-206 - Acute Care Unit, H.S.C.H., 2211 Wesbrook Mall, Vancouver, B.C. V6T 1W5.

The last day for submission of applications for admission to the four-year B.S.N. program for the Winter Session beginning the following September is May 31, with necessary documents and official transcripts to be in the Registrar's office by June 30.

The last day for submission of applications for admission to the baccalaureate program for registered nurses is February 1.

Within two weeks of notification of acceptance by the University the successful applicant for the B.S.N. program is required to submit to the School of Nursing a deposit of $200 (by cheque payable to the University of British Columbia). This deposit will be applied toward the tuition of the first term of the session for which the applicant has been accepted. The deposit is refundable upon written notification by applicant of inability to attend no later than August 1.

The School of Nursing has a limited enrolment. Since the number of qualified applicants usually exceeds the number of places available, fulfilment of the following requirements is not a guarantee of admission. The faculty reserves the right of selection of all students for admission and readmission to the School. An interview may be arranged if counselling is desired.

Applicants whose first language is not English must demonstrate competence in both oral and written English. Prior to being admitted to the School, applicants may be asked to enrol in a special program to remedy defects demonstrated in English usage.

Admission to the First Year of the four-year B.S.N. program

Applicants must meet the general admission requirements of the University which are British Columbia Senior Secondary School graduation or the equivalent with a 'C+' average (2.5 on a 4-point scale). British Columbia secondary school graduation must include the following courses: English 11, English 12, Social Studies 11, Algebra 11, French 11 or a foreign language 11, Physics 11, Biology 11, Biology 12, Chemistry 11, Chemistry 12, and one additional course numbered "12" from the list of acceptable courses in the General Information Section of the Calendar. Out-of-province applicants must present equivalent Science courses. The University will consider granting transfer credit for all appropriate post-secondary (college and university) courses completed although the length of time to complete the program will still be four years.

Admission to the Third Year of the four-year B.S.N. program for Registered Nurses

No specific courses at the secondary school level are mandatory for registered nurse applicants.

Applicants applying as registered nurses must be registered in British Columbia or be eligible to so register. Applicants are required to provide evidence of ability to perform to the level of competence expected of a new graduate as congruent with R.N.A.B.C. guidelines.

Acceptable evidence includes one of the following:

(i) Satisfactory references from employers for work within three years of admission to U.B.C. School of Nursing.

(ii) Proof of satisfactory completion of a refresher course approved by R.N.A.B.C. within three years of admission to U.B.C. School of Nursing followed by at least six months of acceptable work experience prior to entry into the program. In addition, satisfactory references are required from:
a refresher course instructor and
a supervisory person in a nursing unit in which the R.N. has had clinical experience during or subsequent to the refresher course.

(iii) Record of graduation from an approved School of Nursing within the last 3 years.

Applicants applying as registered nurses must provide evidence of preparation in psychiatric nursing. One or more of the following is acceptable:

(i) Official transcript showing theoretical and clinical preparation at the basic level or

(ii) Acceptable standing in registration examination in psychiatric examination or

(iii) Acceptable standing in the mental health course offered at B.C.I.T. or

(iv) Three months of full-time work experience in an acute care psychiatric setting with satisfactory reference.

Students entering as registered nurses from schools other than The University of British Columbia must complete a minimum of thirty (30) units of courses of the Third and Fourth Years of the B.S.N. degree program. For students entering as registered nurses a maximum of fifteen (15) units of course work completed at other institutions may be transferred provided such work meets all the requirements of the University and the School of Nursing. All B.S.N. degree requirements must be met within a maximum of five years of initial enrolment.

Re-admission

The School reserves the right to readmit students and to stipulate conditions attached to readmission. Readmission to the School may necessitate repetition of nursing courses previously completed if, in the judgment of faculty, curriculum changes and/or length of interruption are sufficient to render the applicant inadequately prepared for the subsequent year. Therefore, students are strongly advised to notify the School of Nursing by February of their intentions to enrol in the clinical nursing course in order that suitable time is available to complete the make-up work. Students may request the option of demonstrating competence in the areas of change as an alternative to completing a make-up experience. Where required preparation is unavailable due to cost or other factors, applicants will be refused admission beyond first-year level, but may be considered for readmission to first year.

Students entering the four-year B.S.N. degree program must meet all requirements within a minimum of four and a maximum of seven years from initial enrolment. Students interrupting their program anytime after completion of the first academic year are advised that curriculum changes may necessitate a period of supplementary work to enable them to fit into the subsequent courses.

Where time normally permitted for completion of degree has lapsed, candidates will be required to provide evidence to justify special consideration.

Advancement and Supplemental Examinations

The minimum passing grade in each nursing course is 60%. A student must achieve 60% or better in both the theoretical and clinical portions of nursing courses in order to advance in the program.

The minimum overall grade for promotion from one year to the next is Class 2 (65% average).

In clinical nursing courses the student is required to have successfully completed clinical practice before being allowed to write the final examination.

Supplemental examinations are available provided that:

(a) the student's attendance in the class has been satisfactory, and all required course work has been completed;
(b) the student has written the final examination and obtained at least 50% if a nursing course or at least 40% if a non-nursing course;
(c) the student has achieved an average of at least 60% in the work of the session including the failed course(s);
(d) the student has not failed in more than 8 units of a full study program;
(e) the student, if part-time, has passed 50% or more of units taken.

NOTE: Full-time study is defined as the full set of required courses of any year of the B.S.N. degree program except for those students with advance credit in which case 12 units is the minimum full-time course load.

Although satisfactory academic performance is prerequisite to advancement, it is not the sole criterion in the consideration of the suitability of a student for promotion or graduation. The faculty reserve the right to require a student to withdraw from the School if considered to be unsuited to proceed with the study or practice of nursing.

Students completing the baccalaureate program will be granted "Honours" standing if First Class standing (a minimum of 80%) is achieved in the third and fourth years of the program with no failed courses.

English Composition Requirements

To qualify for the degree of B.S.N. students must satisfy the English Composition requirement of the School of Nursing. To do this students must obtain credit for English 100 and must pass the English Composition Test (ECT). Each student must attach a fee sticker to the ECT booklet. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10:00) from the Department of Financial Services.

Students (including transfer students) who have obtained credit for English 100 but who have not passed the Composition Test will write it in late September. The Test will also be given during the December examination period, in late March or April, and in July. Students who anticipate difficulty passing the Test are advised to enrol in a remedial English course in the Centre for Continuing Education.

Requirements for Nurse Registration

Students who successfully complete the four-year B.S.N. program and who are recommended by the Director of the School of Nursing to the Registered Nurses' Association of British Columbia will be eligible to write the nurse registration examinations and to apply for nurse registration in B.C. on passing the examination.

Information relative to other requirements for registration may be obtained from the Registered Nurses' Association of British Columbia, 2855 Arbutus Street, Vancouver, B.C. V6J 3Y8. Applicants who have reason to believe they may not be eligible for registration should consult the professional association before beginning studies.

Costs Other Than Sessional Fee

There are additional expenses for uniforms, travel and clinical practice. Students should be prepared to have clinical practice outside the Vancouver area and therefore should include travel costs for this experience in estimating total expenses. Students are encouraged to try to have access to a car for transportation to minimize time and effort expended in travel to the varied areas used for clinical experiences.

The School will provide applicants with information regarding these additional costs.

The Program

First Year

Nursing 101 Introduction to Nursing	4 units
English 100 Literature and Composition	3 units
Psychology 100 Introductory Psychology	3 units
Zoology 153 Human Biology	3 units
Microbiology 153 Applied Microbiology	1½ units
Family and Nutritional Sciences 209 Nutrition *or* Family and Nutritional Sciences 203 Introductory Nutrition	1½ units
Physical Education 205 Exercise Programs: Level I	1 unit

Note: Students are required to complete the St. John Ambulance Association Basic Life Support Cardio-Pulmonary Resuscitation course before entering Second Year and to be re-certified yearly.

Second Year

Nursing 201 Nursing Care I	8 units
Pharmacy 240 Pharmacology for Nurses	1½ units
Pathology 375 Introduction to Human Pathology	1 unit
Anthropology or Sociology — to be selected in consultation with the adviser	3 units
*Elective	3 units
Physical Education 205 Exercise Programs: Level II	1 unit

Third Year

**Nursing 301 *or* 302 Nursing Care II *or* The Process of Nursing	4 units
Nursing 303 Family Nursing Care	3 units
Nursing 304 Introduction to Nursing Research	1½ units
Nursing 305 Professional Issues I	1½ units
Nursing 426 Health Care and Epidemiology	3 units
Statistics 203 Statistical Methods I	1½ units
*Elective	3 units
***Physical Education 205 Exercise Programs: Level III	1 unit
OR	
Physical Education 205 Exercise Programs: Level I & II	2 units

Note: Registered nurse students are expected to complete the St. John Ambulance Basic Life Support Cardio-Pulmonary Resuscitation course before entering third year.

Fourth Year

Nursing 403 Advanced Nursing Care	6 units
Nursing 405 Professional Issues II	1½ units
Nursing 406 Management of Nursing Care	1½ units
Nursing 408 *or* 409 Guided Study in Nursing *or* Clinical Nursing Electives	3 units
*Electives	6 units
Physical Education 205 Exercise Programs: Level III	1 unit

*Any three or six units of courses in the University subject to prerequisites and approval of the School of Nursing.

In selecting electives students are advised to consider:

(a) purposes to be served by the electives in the student's total program, i.e. selecting courses in one content area for depth of knowledge vs. selecting courses in several content areas for breadth of knowledge.
(b) necessary prerequisites for desired upper level courses.
(c) career goals, e.g. graduate study, nature of employment.
(d) acceptability of certain electives because of duplication of content included in nursing courses.

Students who wish counselling should seek it well in advance of registration week.

**Nursing 301 to be taken by generic baccalaureate students; Nursing 302 to be taken by entering registered nurse students.

***Level III to be taken by generic baccalaureate students; Levels I and II to be taken by entering registered nurse students.

MASTER'S PROGRAM

Goals of the Master's Program

The graduate of the Master's program is prepared to:

1. Demonstrate proficiency in giving nursing care, based on a conceptual framework for nursing, to individuals, families, and groups.
2. Demonstrate ability to use the research process in nursing.
3. Demonstrate expert knowledge and skills in a selected functional area: teaching, administration, or clinical practice.
4. Demonstrate accountability in the performance of professional roles.
5. Promote the delivery of quality health care.
6. Promote continued professional growth in self and others.
7. Provide leadership in the development of the profession.

Admission Requirements

Applicants are required to meet the admission requirements of the Faculty of Graduate Studies (see Graduate Studies section).

Applicants are normally required to be graduates of a baccalaureate program in nursing which included instruction and clinical experience in community health nursing and psychiatric nursing, and an introductory course in statistics. Registered nurses holding a baccalaureate degree in a field other than nursing may be admitted to the Master's program at the discretion of the School. Such applicants may be required to complete up to fifteen units of course work to qualify for admission.

Applicants are required to have had sufficient experience to insure an acceptable level of competence in nursing.

Applicants seeking information about the Master's program in nursing or application forms should write to: The Graduate Adviser, The University of British Columbia, School of Nursing, T206 2211 Wesbrook Mall, Vancouver, B.C., V6T 1W5.

THE PROGRAM

The M.S.N. degree requires the successful completion of a two-year program of study. The candidate may elect to complete:

24 units of course work and a thesis for 3 units,

OR

27 units of course work, at least one major essay, and a comprehensive examination.

Requirements for the M.S.N. Degree

Core Requirements

Nursing 510 Theory Development in Nursing	1½ units
Nursing 522 Nursing Research	2 units
Nursing 542 Selected Concepts in Clinical Nursing	4 units
Nursing 546 Nursing and the Delivery of Health Care	1½ units
Nursing 597 Graduate Seminar in Professional Nursing	1½ units
Health Care and Epidemiology 400 Statistics in the Health Sciences or equivalent	1½ units

Requirements from Area of Specialization

Clinical Specialization Focus

Nursing 548 Clinical Specialization I	1½ units
Nursing 588 Clinical Specialization II	6 units
Support courses, chosen with faculty adviser	4½ units

Teaching Focus

Nursing 564 Curriculum Development in Nursing	3 units
Nursing 580 Teaching in Clinical Nursing	3 units
Support courses, chosen with faculty adviser	6 units

Administration Focus

Nursing 574 Administration in Nursing	6 units
Support courses, chosen with faculty adviser	6 units

Additional Requirements

Program with Thesis

Nursing 599 Master's Thesis	3 units

Program With Comprehensive Examination

Nursing 590 Directed Studies in Nursing	3 units

CONTINUING NURSING EDUCATION

Within the Division of Continuing Education in the Health Sciences, the Continuing Nursing Education Division has four objectives:

1. To facilitate planning, co-ordination and strengthening of educational opportunities for nursing personnel in British Columbia by:
   - — offering consultative services to professional associations, educational institutions and health care agencies concerning continuing nursing education.
   - — stimulating the use of effective techniques and formats in continuing nursing education.
   - — collaborating with other organizations in the province having similar goals.
2. To offer educational opportunities to registered nurses by providing post basic clinical and functional courses for nurses who wish to deepen their knowledge and skills in a specialized field of nursing practice by:
   - — providing short courses for nurses who wish to update their knowledge and skills in an area of nursing practice.
   - — providing comprehensive career-oriented post-graduate programs in clinical nursing specialties and nursing education.
   - — providing interprofessional continuing education courses in co-operation with other divisions of continuing education.
3. To contribute to the development of the discipline of continuing nursing education by:
   - — adding to the body of knowledge of continuing nursing education by stimulating, supporting and conducting research in continuing nursing education.
   - — providing learning experiences for nurses pursuing studies in adult education.
4. To demonstrate leadership in the pursuit of new avenues for distance delivery of continuing education programs.

The Division of Continuing Nursing Education produces a Calendar for Fall/Winter offerings and for Spring/Summer programs. In addition, announcements or brochures for individual nursing courses are distributed to health care agencies, selected nursing groups and chapters of the Registered Nurses' Association of British Columbia.

Inquiries may be directed to:

The University of British Columbia
Continuing Education in the Health Sciences
Room 105 — 2194 Health Sciences Mall
Vancouver, B.C. V6T 1W5
(Telephone 228-3055)

AWARDS AND FINANCIAL ASSISTANCE

A supplement to this Calendar entitled "Awards and Financial Aid" contains a list of current academic awards (scholarships, prizes, etc.) and available financial assistance (grants, bursaries and loans). Students are encouraged to consult the supplement to determine awards for which they may be eligible. Students are advised to refer to the supplement for interpretation of "full-time" study as it relates to eligibility for scholarships and other forms of financial assistance. For further information and application forms contact The University of British Columbia, University Awards Committee, Rm. 50, General Service Administration Building, 2075 Wesbrook Mall, Vancouver, British Columbia. V6T 1W5.

The following awards are not administered by the University Awards Committee:

Registered Nurses Foundation—A number of bursaries are offered through the Foundation. Information is available from the Registered Nurses' Foundation of B.C., 2855 Arbutus Street, Vancouver, B.C. V6J 3Y8.

Victorian Order of Nurses for Canada—Bursaries available to students in the final year of B.S.N. program. Information and application forms may be obtained from: The National Director, Victorian Order of Nurses for Canada, 5 Blackburn Avenue, Ottawa, Ontario K1N 8A2.

Canadian Heart Foundation—Nursing research fellowship for Master's student undertaking study in some areas of cardiovascular or stroke research. Information available from: Robert Guy, Canadian Heart Foundation, Suite 1200, 1 Nicholas Street, Ottawa, Ontario.

Local R.N.A.B.C. Districts and Chapters—Many Chapters and other local organizations offer bursaries and/or loans to students from their area. Information can be obtained from Director, U.B.C. School of Nursing or Registered Nurses Association of B.C.

C.N.A. Loan Fund—Information and application forms may be obtained from the Canadian Nurses Association, 50 The Driveway, Ottawa, Ontario, K2P 1E2.

Canadian Nurses Foundation Awards—Members of the Canadian Nurses Association may apply for awards and fellowships valued at $4,500 for study at the doctoral level, $3,000 for study at the Master's level and $1,500 for study at the baccalaureate level in nursing. Application forms may be obtained from C.N.F. after November 1 and must be submitted by April 30. Information and/or application forms available from The Canadian Nurses Foundation, 50 The Driveway, Ottawa, Ontario, K2P 1E2.

Alumnae Associations—Many Schools of Nursing Alumnae Associations offer bursaries and/or loans to their members. Information about these would be obtainable from the Director of the School from which you have graduated.

1986-87

THE FACULTY OF PHARMACEUTICAL SCIENCES

ACADEMIC STAFF

JOHN H. McNEILL, B.Sc. (Pharm.), M.Sc. (Alta.), Ph.D. (Mich.), Dean of the Faculty and Professor of Pharmacology and Toxicology.

TERENCE H. BROWN, B.S.P. (Brit. Col.), M.S., Ph.D. (Wash.), Associate Dean of Undergraduate Programs and Associate Professor of Pharmaceutical Chemistry.

JOHN N. HLYNKA, B.Sc. (Pharm.), (Alta.), M.Sc. (Philadelphia), Ph.D. (Alta.), Professor of Clinical Pharmacy and Executive Director, Drug and Poison Information Centre.

JAMES E. AXELSON, B.S. (Wash.), Ph.D. (State Univ. of N.Y. at Buffalo), Professor of Pharmaceutics.

GAIL D. BELLWARD, B.S.P., M.S.P., Ph.D. (Brit. Col.), Professor of Pharmacology and Toxicology.

JACK DIAMOND, B.Sc. (Pharm.), M.Sc. (Alta.), Ph.D. (Mich.), Professor of Pharmacology and Toxicology.

SIDNEY KATZ, B.Sc., M.Sc., Ph.D. (McGill), Professor of Pharmacology and Toxicology.

DONALD M. LYSTER, B.Sc. (Pharm.), M.Sc., Ph.D. (Alta.), Professor of Radiopharmacy.

ALAN G. MITCHELL, B.Pharm., Ph.D. (London), M.P.S., Professor of Pharmaceutics.

BRIAN D. PATE, M.Sc. (London), Ph.D. (McGill), Professor of Pharmaceutical Chemistry and Associate Director of TRIUMF.

BASIL D. ROUFOGALIS, B.Pharm., M.Pharm., Ph.D. (Sydney, Australia), Professor of Pharmaceutical Chemistry.

JANIS O. RUNIKIS, B.S., M.S., Ph.D. (Wash.), Professor of Pharmaceutics.

JOHN G. SINCLAIR, B.S.P. (Sask.), Ph.D. (Purdue), Professor of Pharmacology and Toxicology.

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DAVID W. FIELDING, B.Sc. (Pharm.), M.Sc. (Dalhousie), Ed.D. (Brit. Col.), Associate Professor and Director of Continuing Pharmacy Education.

KEITH M. J. McERLANE, B.Sc. (Pharm.), Ph.D. (Alta.), Associate Professor of Pharmaceutical Chemistry.

RICK BACHAND, B.Sc. (Pharm.) (Alta.), Pharm. D. (Minnesota) Assistant Professor (Part-time) in Clinical Pharmacy.

HELEN M. BURT, B.Pharm. (Bath), Ph.D. (Brit. Col.), Assistant Professor of Pharmaceutics.

JOHN W. DANCEY, B.S.P. (Sask.), M.Sc. (Iowa), Assistant Professor of Clinical Pharmacy (Part-time), Director of Pharmaceutical Services, Lions Gate Hospital.

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ALLAN M. GOODEVE, Phm.B. (Toronto), B.S.P. (Sask.), M.Sc.Phm. (Toronto), Ph.D. (Purdue), Assistant Professor of Pharmacognosy.

DAVID S. HILL, B.Sc. (Pharm.), M.Sc. (Brit. Col.), Assistant Professor of Clinical Pharmacy (Part-time), Director of Pharmacy Services, H.S.C. Hospital.

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LAURA-LYNN POLLOCK, B.Sc. (Pharm.) (Brit. Col.), Instructor in Clinical Pharmacy.

MARGUERITE YEE, B.Sc. (Pharm.) (Brit. Col.), Instructor in Pharmaceutics.

MARGOT E. ALDERDICE, M.Sc. (Brit. Col.), Lecturer in Pharmaceutical Chemistry.

PETER W. BELL, B.Sc. (Pharm.) (Manitoba), M.B.A. (Western Ontario), Honorary Lecturer, Pharmacy Administration.

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BARBARA CADARIO, B.Sc. (Pharm.) (Brit. Col.), Lecturer in Clinical Pharmacy.

SONIA F. Y. CHAN, B.Sc. (Pharm.), M.Sc. (Brit. Col.), Lecturer in Pharmaceutics.

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RHONDA DIER, B.Sc. (Pharm.) (Brit. Col.), Pharm.D. (Minnesota), Lecturer (Part-time), Clinical Pharmacy, Regional Coordinator, Hospital Pharmacy Residency Program.

NANCY J. EAKINS, B.Sc. (Pharm.) (Brit. Col.), Sessional Lecturer in Pharmaceutics.

DONALD HAMILTON, B.Sc., B.Sc. (Pharm.) (Brit. Col.), Part-time Lecturer in Clinical Pharmacy.

DEBRA FREEMAN, B.A., Pharm.D. (Calif.), Lecturer in Clinical Pharmacy and Coordinator, Poison Control.

S. KERR, B.Sc. (Pharm.) (Brit. Col.), Part-time Lecturer in Clinical Pharmacy.

ANN LEATHAM, B.Sc. (Pharm.), M.Sc. (Brit. Col.), Part-time Lecturer in Clinical Pharmacy.

B. LOUIS, B.Sc. (Pharm.) (Brit. Col.), Lecturer in Clinical Pharmacy.

DOUG MALYUK, B.Sc. (Pharm.) (Brit. Col.), Pharm.D. (Minn.), Part-time Lecturer in Clinical Pharmacy.

J. MASUHARA, B.Sc. (Pharm.) (Brit. Col.), Lectuer in Clinical Pharmacy.

PENELOPE F. MILLER, B.Sc. (Pharm.) (Brit. Col.), Lecturer in Clinical Pharmacy (Part-time), Pharmacist, Campus Pharmacy.

B. NAKAGAWA, B.Sc. (Pharm.) (Brit. Col.), Part-time Lecturer in Clinical Pharmacy.

MARION PEARSON, B.Sc. (Pharm.) (Brit. Col.), Lecturer in Pharmaceutics.

GORDON SLOBIN, B.A., B.S.P. (Brit. Col.), Lecturer in Pharmaceutics.

NORMAN S. THOMAS, B.S.P. (Brit. Col.), Part-time Lecturer in Pharmaceutical Law.

GILLIAN A. WILLIS, Ph.C., M.P.S. (New Zealand), M.P.S. (Great Britain), Lecturer in Clinical Pharmacy and Coordinator, Poison Information.

RONALD HARROP, B.A., M.A., Ph.D. (Cantab.), Honorary Professor in Pharmaceutical Chemistry.

FINLAY A. MORRISON, Pharm.D. (Calif.), Honorary Professor in Pharmacy Administration.

BERNARD E. RIEDEL, C.D., B.Sc., M.Sc. (Alta.), Ph.D. (W. Ont.), Honorary Professor in Pharmacy Administration.

JOEL C. ROGERS, B.S. (M.I.T.), M.S., Ph.D. (Calif. L.A.), Honorary Associate Professor in Pharmaceutical Chemistry.

REID GLOVER, B.Sc. (Pharm.) (Brit. Col.), Honorary Assistant Professor in Clinical Pharmacy; Co-ordinator of Pharmacy Systems, H.S.C. Hospital.

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FREDERICK W. KRAUSE, B.Sc. (Pharm.) (Alta.), Honorary Lecturer in Pharmaceutical Law.

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RODERICK NESKE, B.Sc. (Pharm.) (Alta.), Honorary Lecturer in Pharmacy Administration.

Clinical Instructors

GORDON ALLEN, B.Sc. (Pharm.) (Brit. Col.)
CLAIRE ALLEN, B.Sc. (Pharm.) (Brit. Col.)
IAN ALLEN, B.Sc. (Brit. Col.)
NARMIN AMARSHI, B.Pharm. (Wales, Cardiff)
DENIS ANDREWS, Pharm.D. (Calif.)
DEREK ANDREWS, B.Sc. (Pharm.) (Brit. Col.)
WILLIAM BAKER, B.S.P. (Brit. Col.)
HELENA BARDOS, B.Sc. (Pharm.) (Brit. Col.)
AMIN BARDAI, B.Sc. (Pharm.) (Brit. Col.)
N. BARONE, B.Sc. (Pharm.)
ALAN BASS, B.Sc. (Pharm.) (Brit. Col.)
D. BENTON, B.S.P. (Wash.)
SUSAN BLACK, B.Sc. (Pharm.) (Brit. Col.).
DIANE BRAMHALL, B.Sc. (Pharm.) (Brit. Col.)
MERLEEN BRANDVOLL, B.Sc. (Pharm.) (Brit. Col.)
C. BROWN, B.Sc. (Pharm.) (Brit. Col.)
B. BROUSSEAU, B.S.P. (Brit. Col.)
A. BUCKSHON, B.Sc. (Pharm.) (Brit. Col.)
PARVIZ BUDALLI, B.Sc. (Sunderland, England)
B. BULINA, B.Sc. (Pharm.) (Brit. Col.).
MARY CARSON, B.S.P. (Sask.)
NEIL CHINALEONG, B.Sc. (Pharm.) (Brit. Col.)
LORNA CHEE, B.Sc. (Pharm.) (Brit. Col.)
D. CHOI, B.Sc. (Pharm.) (Brit. Col.)
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JOHN CLOUTIER, B.Sc. (Pharm.) (Brit. Col.)
N. COCKCROFT, Ph.D. (Manchester)
KATHLEEN COLLIN, B.Sc. (Pharm.) (Brit. Col.)
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HEIN, B.Sc. (Pharm.)
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ALLEN JANG, B.Sc. (Pharm.) (Brit. Col.)
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LEON JUNG, B.Sc. (Pharm.) (Brit. Col.)
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M. H. LALANI, B.Pharm. (Karachi)
MIGUEL LAM, B.Sc. (Pharm.) (Brit. Col.)
WENDY LAM, B.Sc. (Pharm.) (Dalhousie)
KAREN LANDSBERG, B.Sc. (Pharm.) (Toronto)
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LOIS M. McISSAAC, B.Sc., B.Sc. (Pharm.) (Dalhousie)
ALBERT McDOUGAL, B.Sc. (Pharm.) (Mass.)
SHARON McKINNON, B.Sc. (Pharm.) (Tor.)
BARBARA MILAIRE, B.Sc. (Pharm.) (Brit. Col.)
M. MILLMAN, B.Sc. (Pharm.) (Brit. Col.)
M. McMILLAN, B.Sc. (Pharm.) (Brit. Col.)
DON MILLWARD, B.S.P. (Brit. Col.)
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JANICE MACK, B.Sc. (Pharm.) (Brit. Col.)
MITSUMO MIYATA, B.Sc. (Pharm.) (Brit. Col.)
B. McKONNACHIE, B.Sc. (Pharm.) (Brit. Col.)
JANET MORRIS, B.Sc. (Pharm.) (Brit. Col.)
VALERIE MOORE, B.Sc. (Pharm.) (Brit. Col.)
LINDA MAH, B.Sc. (Pharm.) (Brit. Col.)
ROBERT NAKAGAWA, B.Sc. (Pharm.) (Brit. Col.)
JAMES NETHERTON, B.Sc. (Pharm.) (Brit. Col.)
WAVERLY NETHERTON, B.S.P. (Brit. Col.)
FRANK NIGHTINGALE, B.Sc. (Pharm.) (Brit. Col.)
BRUCE OBERSON, B.Sc. (Pharm.) (Brit. Col.)
DEREK OBERTAS, B.Sc. (Pharm.) (Brit. Col.)
DIANE OSTROWSKI, B.Sc. (Pharm.) (Brit. Col.)
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KEN PEARSE, B.Sc. (Pharm.) (Brit. Col.)
MARION PEARSON, B.Sc. (Pharm.) (Brit. Col.)
SANNA PELLETT, B.Sc. (Pharm.) (Brit. Col.)
PAUL POLACHEK, B.Sc. (Pharm.) (Brit. Col.)
S. RIGGS, B.Sc. (Pharm.) (Brit. Col.)
TOM RAY, B.Sc. (Pharm.) (Brit. Col.)
DANIEL RIMEK, B.Sc. (Pharm.) (Brit. Col.)
G. SCHOEPP, B.S.P. (Sask.)
NANCY SCHULTZ, B.Sc. (Pharm.) (Brit. Col.)
ED SENNIN, B.Sc. (Pharm.) (Brit. Col.)
DAVID SETO, B.Sc. (Pharm.) (Brit. Col.)
CY SMITH, B.Sc. (Pharm.) (Brit. Col.)
STEPHANIE SOON, B.Sc. (Pharm.) (Brit. Col.)
BILL STANBURY, B.Sc. (Pharm.) (Brit. Col.)
DON TAKAKI, B.Sc. (Pharm.) (Brit. Col.)
LUCIA TASCHUK, B.Sc. (Pharm.) (Brit. Col.)
HUGH THIBAULT, B.Sc. (Pharm.) (Brit. Col.)
SHIRAZ THOBANI, B.Sc. (Pharm.) (Brit. Col.)
THOMAS TSANG, B.Sc. (Pharm.) (Brit. Col.)
LOIS TWARDY, B.Sc. (Pharm.) (Brit. Col.)
PATRICIA VASSALLO, B.Sc. (Pharm.) (Brit. Col.)
BETTINA VOIGT, B.Sc. (Pharm.) (Kiel, W. Germany)
KEN WARD, B.Sc. (Pharm.) (Brit. Col.)
TREVOR WATSON, B.A. (Manit.), B.S.P. (Brit. Col.)
KATHY WELLINGTON, B.Sc. (Pharm.) (Brit. Col.)
JULIE WHITE, B.Sc. (Pharm.) (Brit. Col.)
N. H. WIEDRICK, B.Sc. (Pharm.) (Brit. Col.)
ROB H. WILLIAMSON, B.Sc. (Pharm.) (Brit. Col.)
KAREN WLOCK, B.Sc. (Pharm.) (Brit. Col.)
ANDY WONG, B.Sc. (Pharm.) (Brit. Col.)
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COLIN WU, B.Sc. (Pharm.) (Brit. Col.)
R. YEE, B.Sc. (Pharm.)
P. YEN, B.Sc. (Pharm.) (Brit. Col.)
TONY YEN, B.Sc. (Pharm.) (Taiwan)
PAUL YU, B.Sc. (Pharm.) (Ohio State)
ELIZABETH ZYGMUNT, B.Sc. (Pharm.) (Brit. Col.)

Lecturers from other Departments

M. B. ISMAN (Plant Science)
C. R. KRISHNAMURTI (Animal Science)
S. M. OBERG (Commerce and Business Administration)

Regional Co-ordinators of Continuing Pharmacy Education.

HANNAH BRADLEY, B.Sc. (Pharm.) (Brit. Col.)
LEIGHTON CAREFOOT, B.Sc. (Pharm.) (Manitoba)
JENNIFER CHATTERSON, B.Sc. (Pharm.) (Birmingham)
JAMES CHIU, B.Sc. (Pharm.) (Brit. Col.)
DAVE COOK, B.Sc. (Pharm.) (Brit. Col.)
DAVID CORMAN, B.Sc. (Pharm.) (Brit. Col.)
CHERYL DAKIN, B.Sc. (Pharm.) (Brit. Col.)
LOIS DEVICK, B.S.P. (Sask.)
JANE DROWN, B.Sc. (Pharm.) (Brit. Col.)
ALDO DORATTI, B.Sc. (Pharm.) (Brit. Col.)
RON GRACAN, B.Sc. (Pharm.) (Brit. Col.)
LOIS HUNTER, B.Sc.P. (Alta.)
NORMAN JANSEN, B.S.P. (Sask.)
MERV KOSZMAN B.S.P. (Sask.)

JULIE LAIRD, B.Sc. (Pharm.) (Brit. Col.)
BARRY LEIGH, B.S.P. (Sask.)
ROBERT LOWTHER, B.S.P. (Brit. Col.)
SUSAN LUI, B.Sc. (Pharm.) (Brit. Col.)
NESTA McGRAW, B.Sc. (Pharm.) (Brit. Col.)
WENDY MILLER, B.Sc. (Pharm.) (Brit. Col.)
ERNIE MOON, B.S.P. (Brit. Col.)
DONNA NEWTON, B.Sc. (Pharm.) (Brit. Col.)
MARION SCHOLZ, B.Sc. (Pharm.) (Brit. Col.)
ERICA SELENT, B.S.P. (Brit. Col.)
JOHN SHASKE, B.Sc. (Pharm.) (Brit. Col.)
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SHARON A. SHEPHERD, B.Sc. (Pharm.) (Brit. Col.)
BETTY SMITH, B.Sc. (Pharm.) (Brit. Col.)
KAY SULUKI, B.Sc. (Pharm.) (Brit. Col.)
GARNET WHITMARSH, B.S.P. (Sask.)

Division of Clinical Pharmacy

R. Ensom, Chairman, L. Brown, R. Bachand, J. W. Dancey, D. duPlessis, D. Freeman, D. Hamilton, D. Hill, J. Hlynka, M. Levine, R. McKerrow, P. Miller, J. G. Moir, B. Nakagawa, M. Nelson, L. Pollock, A. Runikis, L. Trottier, L. Twaites, G. A. Willis, M. Yee, and Clinical Instructors listed above.

Division of Pharmaceutics

J. M. Orr, Chairman, J. E. Axelson, S. Chan, H. Burt, N. Eakins, L. R. Goodeve, G. Gudauskas, A. G. Mitchell, G. Slobin, M. Yee.

Division of Pharmaceutical Chemistry

F. S. Abbott, Chairman, M. Alderdice, T. H. Brown, A. M. Goodeve, D. M. Lyster, K. M. J. McErlane, B. Pate, B. D. Roufogalis

Division of Pharmacology and Toxicology

G. D. Bellward, Chairman, J. Diamond, S. Katz, K. MacLeod, J. H. McNeill, J. G. Sinclair

Division of Pharmacy Administration

D. W. Fielding, Chairman, P. Bell, J. Charles, G. G. Henderson, F. Krause, K. McCartney, R. McDermit, F. A. Morrison, R. Neske, B. E. Riedel, N. Thomas.

THE FACULTY OF PHARMACEUTICAL SCIENCES

General

The Faculty of Pharmaceutical Sciences was established in 1945 and is housed in the George T. Cunningham Building. The first wing of the building was completed in 1960 and is used primarily for the undergraduate program. The research wing was completed in 1970 and provides space for the graduate program. The administrative offices of the Faculty are located on the third floor of the P.A. Woodward Instructional Resources Centre.

Degrees

The Faculty of Pharmaceutical Sciences offers courses leading to the degree of Bachelor of Science in Pharmacy, B.Sc. (Pharm.) and to the degrees of Master of Science (M.Sc.) and Doctor of Philosophy (Ph.D.).

Program of Study

The course leading to the Bachelor of Science in Pharmacy degree is designed to prepare graduates to enter a wide variety of careers associated with pharmacy in community pharmacies and hospitals, in industry and government service and other specialized fields. This course satisfies the requirement of the Pharmacists Act for academic qualification for licensing in the Province of British Columbia. It also meets the requirements of the standard curriculum as approved by the Association of Faculties of Pharmacy of Canada.

Part-Time Program of Study

Students may be admitted to part-time study programs toward the degree B.Sc. (Pharm.).

1. A program of studies will be arranged with each individual by the Office of the Dean.
2. Courses must be scheduled on the basis of the current timetable at the time of registration.
3. Courses of the fourth year constituting the required courses (10 units) must be taken concurrently.
4. Total time allowed for the completion of the degree is 8 years.

Admission

(i) General Requirements

For admission to the Faculty it is required that the student shall have completed the First Year in the Faculty of Science with credit for the courses shown below and an average grade of at least 60%, or that he or she shall have fulfilled the equivalent of these requirements by work taken in an approved college or university.

Students are not admissible to the Faculty directly from Grade 12 obtained in any Canadian province. Such students should seek admission to a pre-Pharmacy year of study in the Faculty of Science if they are residents of B.C., otherwise they should complete the pre-Pharmacy requirements at their own provincial university or regional college.

The required pre-Pharmacy subjects are Chemistry 103 or 110 or 120; English 100; Mathematics 100 and 101 or Statistics 105; two from the following three subjects: Biology, Physics or an elective 3 units. Acceptable courses are Physics 110 or 115 or 120, and Biology 101 or 102 and Elective 3 units. The course from the above three subjects not completed for entrance will be taken in First Year Pharmacy.

Students transferring to the Faculty from another faculty or university, and who have prerequisites equivalent to those outlined above must consult the Office of the Dean with regard to an approved program.

Students desirous of entering the Faculty who do not meet the normal requirements for admission should consult the Office of the Dean.

(ii) English Composition Requirement

To qualify for the degree of B.Sc. (Pharm.) students must satisfy the Faculty of Pharmaceutical Sciences English Composition Requirement. To do this, students must obtain credit for English 100 and must pass the English Composition Test (ECT). Each student must attach a fee sticker to the ECT booklet. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services.

Students (including transfer students) who have obtained credit for English 100 but who have not passed the Composition Test will write it in late September. The test will also be given during the December Examination period, in late March or April, and in July. Students must have successfully completed the English Composition Requirement before entering the Third Year of the program. Students anticipating difficulty in passing the Test are advised to enrol in a remedial English course in the Centre for Continuing Education.

(iii) Advanced Standing

Any student who has taken scheduled courses or their equivalent in another faculty or university may, upon application, be granted such standing as the Faculty may determine.

Students who have completed the equivalent of second year Science may be admitted to the second year of Pharmacy and will take Pharmacy 110 and 210 concurrently.

(iv) Application

All applicants applying for entry into the Faculty for the first time, must make formal application to the Registrar of the University as early as possible in the year, and in any event, not later than May 31st. An applicant should procure an application form from the office of the Registrar so that it can be completed on or before that date whether or not transcripts are then available. Late applications will not be considered.

Due to lack of space, enrolment in the Faculty is limited. Applicants should therefore regard the satisfying of the entrance requirements as meaning only that they are eligible for selection and that such selection shall be solely within the discretion of the Faculty of Pharmaceutical Sciences.

When notified that application has been accepted, each applicant shall, within two weeks of notification, send to the Office of the Dean of the Faculty of Pharmaceutical Sciences, a deposit of fifty dollars ($50.00) (by cheque payable to the University of British Columbia), which deposit will later be applied to the tuition fees. If the applicant is unable to register and notifies the Office of the Dean of this fact not later than August 20, the deposit will be refunded. If the applicant does not register or neglects to notify the Office of the Dean of change of intention until after August 20th, the deposit will be forfeited.

NOTE:

The deposit of fifty dollars is payable only by those applicants who receive official notification of their admission to the Faculty of Pharmaceutical Sciences and should **not** be sent in with the initial application for admission.

(v) Registration

Applicants who are accepted will be mailed an authorization to register form giving details of the time and place for registration in the Faculty.

Attendance, Examinations and Advancement

1. Regular attendance is expected of students in all their classes (including lectures, laboratories, tutorials, seminars, etc.). Students who neglect their academic work and assignments may be excluded from the final examinations. Students who are unavoidably absent because of illness or disability should report to their instructors on return to classes.
2. Students who because of illness are absent from a December or April examination must submit a certificate, obtained from a physician to the University Student Health Service, as promptly as possible.
3. In any course which involves laboratory work a student must complete the laboratory assignments with a satisfactory record before being admitted to the written examination of the course. A student may be required by the Faculty to discontinue such a course, during any term, because of failure to maintain a satisfactory standing in laboratory work, or because of absence from an appreciable number of laboratory periods through illness or other causes.
4. The passing mark for a course in the Faculty of Pharmaceutical Sciences is 50%.
5. A student who has failed in more than 6 units will be considered to have failed in the work of that year, and will not receive credit for any of the courses passed in that year.
6. Any student whose academic record, as determined by the tests and examinations of the first term, is found to be unsatisfactory, may be required to discontinue attendance at the University for the remainder of the session.
7. Term essays and examination papers may be refused a passing mark if they are noticeably deficient in English.

Promotion Requirements

To be promoted, a student in the Faculty of Pharmaceutical Sciences must:

(a) Pass all of the required courses of the program year in which the student is registered.

(b) Obtain a minimum average standing of 60% in the required courses of the program year in which the student is registered.

1. Required courses, with the exception of English 301, are used for this computation; thus elective courses are excluded. Failure in elective courses requires that the course be repeated, or an approved alternative course be taken.
   Students who have entered the Faculty at the Second year level will take any required courses of the First year in which they are deficient, as required courses of the Second year.
2. A student who by these regulations is not promotable may be required to repeat the work of that year or to withdraw from the Faculty and will not be able to take any of the required courses of subsequent years.
3. A student who fails to meet promotion standards for a second time either in a repeated year or a subsequent year, will normally be required to withdraw from the Faculty.
4. Courses for which credit has not been obtained must be repeated or permissible substitutes taken, in the next regular session attended. In the winter session, the total for all courses taken may not exceed 19 units except with approval of the Dean of the Faculty.
5. A student with standing deficient in more than 3 units, although not permitted to register in the higher year, may be allowed to continue by registering in the lower year and taking courses in accordance with Paragraph 4 above.

Supplementals and Examinations for Higher Standing

1. A student who has obtained an average of at least 50% in the final examinations of the session may be granted supplemental examinations in the subject or subjects failed provided a final grade of not less than 40% was obtained. Notices will be sent to students to whom such supplemental examinations have been granted.
2. In any one session no candidate will normally be granted supplemental privileges in more than 3 units.
3. A student who has failed in more than 6 units will be considered to have failed in the work of that year, and will not receive credit for any of the courses passed in that year.
4. A supplemental examination may be written only once except in the case of a Final Year student who may write twice. Should a supplemental be failed the course concerned must be repeated or a suitable substitute taken.
5. Where supplemental privileges are granted, the standing shall be recalculated for purposes of promotion based on the actual marks obtained in these examinations.
6. In any one session, for purposes of promotion, a student may be allowed to rewrite a maximum of 3 units of course work for higher standing. These 3 units of course work will be the subject or subjects in which the student has obtained the lowest standing or at the discretion of the Dean.
7. The total of supplementals and examinations for higher standings should not normally exceed 3 units.

Graduate Studies

For details of Graduate Studies see the Faculty of Graduate Studies section of the calendar.

Requirements for Licensing

Registration with the College of Pharmacists of British Columbia:

(a) Student Registration
It is recommended that students register with the College of Pharmacists of British Columbia during their first year in the Faculty of Pharmaceutical Sciences. To comply with the Pharmacists Act requirements, registration with the College of Pharmacists of British Columbia must be completed before registration in the fourth year of the pharmacy curriculum. Proof of such registration must be presented at the time of registration in the Fourth year.

(b) Pharmacist Licensing
The possession of a B.Sc. (Pharm.) does not in itself confer the right to practise pharmacy in any province of Canada. In order to practise pharmacy in the Province of British Columbia, it is necessary to be registered as a pharmacist with the College of Pharmacists of British Columbia.

Details of these requirements may be obtained from the Registrar of the College of Pharmacists, 240-1575 West Georgia Street, Vancouver, B.C., V6G 2V3

Pharmacy Examining Board of Canada

The Board provides for examinations and issues a certificate to the successful candidate which may be filed with a Canadian provincial licensing body in connection with an application for licence to practise Pharmacy under the laws of that province. Information relative to the dates of examinations, application forms, etc., may be obtained through the Office of the Dean.

Continuing Education

Continuing Education is sponsored jointly by the Faculty of Pharmaceutical Sciences and the College of Pharmacists of British Columbia. The co-ordination of the programs is through the Division of Continuing Education in the Health Sciences.

The program is directed to the following objectives:

1. to provide a means by which pharmacists can systematically update their knowledge through a planned program of instruction in specific areas of pharmaceutical sciences.
2. to provide courses giving pharmacists broader and deeper insights into special subject areas.
3. to provide courses directed to the needs of a particular specialty within the profession, e.g. Hospital Pharmacy, etc.

First Aid:

It is recommended that all pharmacy students obtain credit for a recognized First Aid course, e.g., St. John Ambulance S.O.F.A. First Aid Course, while completing their B.Sc. (Pharm.) degree.

CURRICULUM

First Year

Subject	First Term Lect.	First Term Lab.	Second Term Lect.	Second Term Lab.
Chem. 205(3), Physical Inorganic and Analytical Chemistry	3	4	3	4
*Chem. 230(3), Organic Chemistry	3	3	3	3
Biology 101(3) or 102(3), Principles of Biology	3	3	3	3
Pharm. 110(3), Pharmaceutics I	3	3	3	3
Physics 110(3), 115(3) or 120(3)	3	3	3	3
English 301(1½), Practical Writing	3	0	or 3	0
Elective 3 units (or 6 units if elective not taken in pre-Pharmacy studies)	3	0	3	0

*Chemistry 230 is a prerequisite for all subsequent Pharmacy courses with the exception of Pharmacy 350.

Second Year

Subject	First Term Lect.	First Term Lab.	Second Term Lect.	Second Term Lab.
Anatomy 390(2), Basic Human Anatomy	2	0	2	0
Biochem. 300(3), Principles of Biochemistry	3	0	3	0
Microbiol. 200(3), Introductory Microbiology	3	2	3	2
Pharm. 335(2) Pharmacology I	0	0	4	0
Pharm. 210(3), Pharmaceutics II	3	3	3	3
Physiology 301(3), Human Physiology	3	0	3	0
Physiology 302(1½), Human Physiology Laboratory	0	3	0	3

Third Year

Subject	First Term Lect.	First Term Lab.	Second Term Lect.	Second Term Lab.
Pharm. 310(3), Pharmaceutics III	3	3	3	3
Pharm. 320(3), Medicinal Chemistry	3	0	3	0
Pharm. 325(3), Pharmaceutical Analysis	3	3	3	3
Pharm. 340(2), Pharmacology II.	4	2	0	0
Pharm. 345(2), Pharmacology III	0	0	4	2
Pharm. 350(1½), Pharmaceutical Law, Ethics and Pharmaceutical Organization	3	0	0	0
Pathology 375(1), Introduction to Human Pathology	1	0	1	0
Elective 1½ units	3	0	or 3	0

Fourth Year

Subject	First Term Lect.	First Term Lab.	Second Term Lect.	Second Term Lab.
Pharm. 401(3), Clinical Pharmacy	3	0	3	0
Pharm. 402(3), Clinical Clerkship I	1	5	1	5
Pharm. 403(1½), Clinical Clerkship II	1	4	or 1	4
Pharm. 406(1), Topics in Pharmacy Practice	2	0	—	—
Pharm. 451 (1½), Introduction to Pharmacy Management	3	0	or 3	0
*Pharm. 469 (0), Professional Practice Clerkship	—	—	—	—
†Electives (see below) minimum 8 units	—	—	—	—

*Compulsory in 1986. Taken in summer immediately prior to entering 4th year.
†The student should elect an area of interest from those listed below and select his courses, with the approval of the Dean and Faculty Advisers.

Areas of Interest

1. Community Pharmacy.
2. Hospital Pharmacy.
3. Governmental and Industrial Pharmacy.
4. Graduate Studies.
5. Nuclear Pharmacy.

Courses offered in Pharmaceutical Sciences

Pharmaceutics: 110, 210, 310, 412, 414, 415, 416, 417.
Pharmaceutical Chemistry: 320, 325, 425, 426, 427.
Pharmacognosy: 434, 437.
Pharmacology: 335, 340, 345, 435, 444, 448.
Clinical Pharmacy: 401, 402, 403, 405, 406, 452, 453, 454.
Pharmacy Administration: 350, 450, 451, 455.

Hospital Pharmacy Residency Program

Specialized postgraduate hospital pharmacy training (52 weeks) is available through Hospital Pharmacy Residency Training Programs in accredited B.C. hospitals, in affiliation with the Faculty of Pharmaceutical Sciences. Further information is available upon request from the Faculty of Pharmaceutical Sciences.

Radiopharmacy Residency

Specialized postgraduate training in the application and handling of radio pharmaceuticals used in diagnosis and therapy is offered by the Vancouver General Hospital in affiliation with the Faculty of Pharmaceutical Sciences. Further information is available upon request from the Faculty of Pharmaceutical Sciences.

The G. D. Searle Visiting Lectureship

A lectureship sponsored by G. D. Searle Co. of Canada Limited. Visiting Lecturers will be selected on the basis of an outstanding contribution made by them on some aspect of drug research or utilization.

Awards and Financial Assistance

A supplement to this Calendar entitled "Awards and Financial Aid" contains a list of current academic awards (scholarships, prizes, etc) and available financial assistance (grants, bursaries and loans). Students are encouraged to consult the above to determine awards for which they may be eligible. For further information and application forms contact the University Awards Office, The University of British Columbia, Vancouver, British Columbia. V6T 1W5.

The following awards are not administered by the University Awards Office:

Aubrey A. Brown Memorial Award ($200 and a Certificate of Merit)

The Aubrey A. Brown Memorial Award is offered for annual competition among members of the graduating classes of Canadian Schools of Pharmacy for the best paper involving research of the library, archives or survey type, but excluding laboratory experimental work. Entries must be submitted through the office of the Dean and must be received by the C.F.A.P. office by June 1st. Copies of the "Conditions Governing the Award" are available in the office of the Dean or from the C.F.A.P. office. (Canadian Foundation for the Advancement of Pharmacy, Suite 325-123 Edward Street, Toronto, Ont. M5G 1E2).

E. L. Woods Memorial Prize in Pharmacy ($200 and a Certificate of Merit)

The E. L. Woods Memorial Prize in Pharmacy is offered for annual competition among members of the graduating classes of Canadian Schools of Pharmacy for the best thesis or research paper based on laboratory experimental work. Entries must be submitted through the office of the Dean and must be received by the C.F.A.P. office by June 1st. Copies of the "Rules of Eligibility" are available in the office of the Dean or from the C.F.A.P. office.

Graduate Fellowships in Hospital Pharmacy (Four at $500 Each)

Four Graduate Fellowships in Hospital Pharmacy are offered for annual competition among graduates from Canadian Schools of Pharmacy to assist the recipients during a one-year hospital pharmacy residency program. To be eligible, applicants must have been accepted for a residency program approved by the Canadian Hospital Pharmacy Residency Board. Applications must be received by the C.F.A.P. office by June 1st. Application forms are available in the office of the Dean or from the C.F.A.P. office.

Fellowships in Professional Practice (Four at $500 each)

Four Fellowships in Professional Practice are offered for annual competition among graduates from Canadian Schools of Pharmacy to applicants presenting study programs in any professional area (i.e. research, clinical pharmacy, radio pharmacy, drug information service, public health, poison control, etc.). Applications must be received by the C.F.A.P. office by June 1st. Application forms are available in the office of the Dean or from the C.F.A.P. office.

Fellowships in Industrial Pharmacy (Four at $250 each)

Four Fellowships in Industrial Pharmacy are offered for annual competition among students registered in Canadian Schools of Pharmacy who have completed an Industrial Pharmacy Summer Studentship Program. Applications must be received by the C.F.A.P. office by September 30th. Application forms are available in the office of the Dean or from the C.F.A.P. office.

The Past Presidents' Award ($250 and a Certificate of Merit)

The Past Presidents' Award is made to the most outstanding student in a Canadian School of Pharmacy based on: (a) scholarship; (b) contribution to the undergraduate life of the university, particularly the school; and (c) likelihood of noteworthy contribution in the future toward the community in his or her profession. The Award is provided annually on a rotational basis among Canadian Schools of Pharmacy. Selection of the winning candidate is made by the Dean or Director in each Faculty, College or School of Pharmacy. The C.F.A.P office should receive the winner's name not later than June 1st.

1986

THE SCHOOL OF PHYSICAL EDUCATION AND RECREATION

(A School in the Faculty of Education)

ACADEMIC STAFF

W. ROBERT MORFORD, B.P.E., M.P.E. (Brit. Col.), Ed.D. (Berkeley), Professor and Director of the School.
ERIC F. BROOM, Dip. in Phys. Ed. (Loughborough Coll.), M.S. (Washington), Ph.D. (Illinois), Professor.
STANLEY R. BROWN, Diploma of Phys. Ed. (Otago), M.S., Ph.D. (Illinois), Professor.
ROBERT G. HINDMARCH, B.P.E. (Brit. Col.), M.S., Ed.D. (Oregon), Professor.
D. LIONEL PUGH, B.A., Dip. in Educ. (Wales), Dip. in Phys. Ed. (Carnegie Phys. Tr. Coll.), Professor.
ROBERT W. SCHUTZ, B.P.E. (Brit. Col.), M.Sc. (Alta.), Ph.D. (Wisconsin), Professor.
F. ALEX CARRE, B.P.E., M.A. (P.E.) (Alta.), Ph.D. (Oregon), Associate Professor.
DOUGLAS B. CLEMENT, B.Sc. (Oregon), M.D. (Brit. Col.), Associate Professor.
IAN MICHAEL FRANKS, B.Ed. (McGill), M.Sc., Ph.D. (Alberta), Associate Professor.
KENNETH D. COUTTS, B.A. (Oberlin College), M.A., Ph.D. (Michigan State), Associate Professor.
RICHARD S. GRUNEAU, B.A. (Guelph), M.A. (Calgary), Ph.D. (Massachussets), Associate Professor.
RICHARD E. MOSHER, B.P.E. (Brit. Col.), M.P.E. (Oregon), Ph.D. (Michigan State), Associate Professor.
G. PENNINGTON, B.A. (Seattle), M.Sc. (Washington), Ed.D. (Oregon), Associate Professor.
JACK B. POMFRET, B.A. (Health and P.E.), M.S. (Washington), Associate Professor.
EDWARD C. RHODES, B.Ed. (Alta.), M.Sc., Ph.D. (Oregon), Associate Professor.
BARBARA SCHRODT, B.P.E. (Brit. Col.), M.S. (Oregon), Ph.D. (Alberta), Associate Professor.
GARY D. SINCLAIR, B.P.E. (Brit. Col.), M.Sc., Ph.D. (Oregon), Associate Professor.
JACK E. TAUNTON, B.Sc., M.Sc. (Simon Fraser), M.D. (Brit. Col.), Associate Professor.
ANNE D. TILLEY, Dip. Dartford College of Physical Education, B.A. (McMaster), M.Ed. (Birmingham), Associate Professor.
PATRICIA VERTINSKY, B.A. (Birmingham), M.Sc. (Calif. L.A.), Ed.D. (Brit. Col.), Associate Professor.
BONNIE GORDON, B.A. (P.E.) (Sask.), M.Sc. (Purdue), Assistant Professor.
NESTOR N. KORCHINSKY, B.P.E., M.A. (Alta.), Ph.D. (Oregon), Assistant Professor.
ROBERT R. LAYCOE, B.S.(Ed.), (Linfield College, Ore.), M.P.E. (Brit. Col.), Assistant Professor.
MOIRA LUKE, Dip. Phys. Ed. (London), M.Ed. (Western Wash.), Ph.D. (Washington), Assistant Professor.
DONALD C. McKENZIE, B.Sc. (Guelph), M.P.E., M.D. (Brit. Col.), Ph.D. (Ohio), Assistant Professor.
P. R. MOODY, Dip. Phys. Ed. (Carnegie College), B.Ed. (Brit. Col.), M.S. (Wash. State), Ph.D. (Alta.), Assistant Professor.
ROBERT E. C. SPARKS, B.A. (Wesleyan), M.S. (Massachusetts), Ph.D. (Massachusetts-Amherst), Assistant Professor.
SHARON A. WHITTAKER BLEULER, B.Sc., M.P.E. (Brit. Col.), M.S. (Wash.), Ph.D. (Wash.), Assistant Professor.
C. INGE WILLIAMS, B.P.E., M.P.E. (Brit. Col.), Ed.D. (Oregon), Assistant Professor.
ALENA BRANDA, B.P.E., M.P.E. (Charles U., Prague), Senior Instructor.
JOHN GLENN KELSO, B.A. (Denver), M.Sc. (Oregon), Senior Instructor.
FRANCIS C. SMITH, B.A., M.Ed. (Eastern Washington State College), Senior Instructor.
GAIL E. WILSON, B.P.H.E. (Toronto), M.P.E. (Brit. Col.), Senior Instructor.
ANNE ANTHONY, M.Ed. (Western Wash.), Senior Instructor.
JEAN CUNNINGHAM, M.A. (Ed.) (Simon Fraser), Instructor I.
ANDREW P. HARRISON, B.Sc., M.Sc. (Syracuse), Coach.
BORIS KLAVORA, B.A. (Ljubljana), M.Sc. (Lakehead), Coach.

THE SCHOOL OF PHYSICAL EDUCATION AND RECREATION

Degree programs offered in the School of Physical Education and Recreation are the Master of Physical Education, the Bachelor of Physical Education and the Bachelor of Recreation Education. In addition, physical education programs are available for students enrolled for the Bachelor of Education degrees (both Secondary and Elementary).

Provision can be made for completion of degree studies on a part-time basis or on a combination of full- and part-time study if desired.

Admission Requirements

See General Information section on Admission.

B.P.E. Degree Program

The School of Physical Education and Recreation accepts graduates of Secondary School programs with any of the specialities offered.

General Requirements for the Degrees of B.P.E. and B.R.E.

Students in all years are normally subject to General Academic Regulations. Supplemental examinations will not be granted in Physical Education Performance Courses. Students who are unable to meet the requirements because of medical or other approved reasons may, at the discretion of the School and with the approval of the Senior Faculty Adviser, be granted deferred examinations. Such privilege will be considered only if the student submits a written application to the Director before the end of the official examination period. When the privilege of supplemental or deferred examinations has been granted, students must complete requirements prior to attendance at the next regular session. The School may require that additional work be undertaken in summer school.

English Composition Requirement

In order to qualify for the degree of Bachelor of Physical Education or Bachelor of Recreation Education, students must satisfy the English Composition Requirement. This means that in addition to completing all English course requirements set out in their degree programs, students must pass the English Composition Test (ECT). Students entering the School at Years One and Two should satisfy the requirement as early as possible, and in no case after Third Year. Those entering the Third year of the program must pass the ECT within one academic year of their initial registration in the School.

Students may write the Test during late September and during the December examination period, in late March or April and in July.

Each student must attach a fee sticker to the ECT booklet. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services. Students enrolled in English 100 will, if eligible, receive a "Fee Waived" sticker from their instructors.

Students who anticipate difficulty passing the Test are advised to enrol in a remedial English course in the Centre for Continuing Education.

Unsatisfactory Standing

(a) A student who passes in fewer than nine units in the first year of University following Grade 12 will not be permitted to re-enrol at the University to repeat the studies of that year. Consideration will be given to re-admitting a student in this category following satisfactory completion of at least two semesters of college study or equivalent.

(b) A student in the First Year who obtains credit for only nine units on a full program will be re-admitted on probation but during the subsequent session may be required at any time to withdraw for unsatisfactory progress.

(c) A student in the Second Year who passes in fewer than nine units will not be permitted to re-enrol to repeat the studies of that year. Admission to the Third Year may be granted if the student can show at some later date, completion of studies at another institution that give full standing equivalent to First and Second Year.

(d) A student in the Third or Fourth Year who passes in fewer than nine units will not be permitted to re-enrol in the Winter Session immediately following. Permission to re-enrol in a subsequent session may be granted if application is approved by the Director of the School.

(e) A student at any level of University study who fails for a second time, whether in repeating a year or in a later year, will be required to withdraw from the University; re-admission may be granted after a period of at least one year if an appeal to Senate is supported by the Committee on Admissions of the Faculty concerned and upheld by the Senate Admissions Committee.

THE BACHELOR OF PHYSICAL EDUCATION DEGREE
(69 units)

The Bachelor of Physical Education (BPE) is designed to meet a wide range of academic and professional needs. The BPE degree requires a second concentration (see Note 2 below); students should select this as soon as possible, and preferably in First Year. Two Options (Exercise Science and Sport Studies) and three Specializations (Aquatics, Dance and Gymnastics) are offered in addition to the regular program. These have specific requirements and students may only enrol in these programs with formal program approval. (See below).

Degree Requirements	**Units**
Courses in the Faculties of Arts or Science or Commerce and Business Administration	30-39
Physical Education Theory Courses	21-30
Physical Education Performance Courses (See Note 1)	9-15
Total	69

B.P.E Program

First Year (16½ Units)

English 100	3
Physical Education 161	1½
Physical Education 163	1½
Physical Education 164	1½
PHED. Performance Courses (see Note 1)	3
Electives (non-PHED) (see Note 2)	6

Second Year (17½ Units)

English at the 200 level or 301/302	3
Physical Education 261	1½
Physical Education 391	3
PHED. Performance Courses (see Note 1)	4
Electives (non-PHED) (see Note 2)	6

Third Year (17½ Units)

Physical Education 370	1½
One of: PHED. 363, 384, 463, 468	1½
PHED. Theory Electives (3 courses)	4½
PHED. Performance Courses (see Note 1)	1-4
Electives (PHED. theory, non-PHED — (see Note 2))	6-9

Fourth Year (17½ Units)

One of: PHED. 363, 384, 463, 468	1½
PHED. Theory Electives (2-4 courses)	3-6
PHED. Performance Courses (see Note 1)	1-4
Electives (PHED theory, non-PHED theory — (see Note 2))	6-12

Notes:

1. **Physical Education Performance Courses**

a) Normally, students are required to take 15 units of performance courses for the B.P.E. degree. Programs for approved options (see below) allow for a minimum of 9 units in performance courses, and only those students for whom an option program has been officially approved will be permitted to enrol for less than 15 units of performance courses. Students taking specializations (see below) are required to complete 15 units of performance courses.

b) **Performance courses are categorized as follows:**
Aquatics: PHED. 230, 231, 232, 233, 234, 330, 331, 332, 333, 430
Dance: PHED. 240, 241, 242, 243, 244, 245, 341, 342, 441
Gymnastics: PHED. 201, 202, 203, 204, 301, 302, 402
Track and Field: PHED. 250, 251, 252, 450
Team Performance Courses: PHED. 206, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 227, 410, 411, 412, 413, 414, 416, 419
Individual Performance Courses: PHED. 207, 220, 221, 222, 223, 224, 225, 226, 228, 229, 290, 423, 426, 428

c) **Required for all students:**
Physical Education 202
Physical Education 203
Physical Education 230 (see Note below)
Physical Education 250
Physical Education 240/241
One course from Team Performance Courses
One course from Individual Performance Courses

These required Performance courses, as listed above by number, may be taken in any of the four years, but it is strongly recommended that they be taken in the first two.

d) A student may not apply more than 15 units in Performance courses toward the B.P.E. degree.

e) All students must be able to swim. Students who have achieved the Senior Red Cross Award, Bronze Medallion or the equivalent, may substitute another Performance course for Physical Education 230, with approval from the Chairman of the Aquatics Courses Committee.

2. Non-P.E. Electives — Students must elect a second area of concentration normally consisting of a minimum of six units in the First and Second Years, and nine units (numbered 300 or higher) normally offered in the Third and Fourth Years of the Faculty of Arts or the Faculty of Science or the Faculty of Commerce and Business Administration. Students who plan to obtain teacher certification should choose their courses so as to satisfy the requirements for admission to the Faculty of Education. Students must consult the appropriate department in the Faculty of Education. Education courses may be credited toward the B.P.E. degree only with prior written approval of the Senior Faculty Adviser. Education courses which are required in a second area of concentration may be taken without prior approval.

— Recreation courses may be included as electives in the category of Physical Education Theory on approval of the Senior Faculty Adviser.

3. Both upper level PHED theory requirements (two of PHED. 363, 384, 463, 468) may be taken in third year, thus decreasing PHED theory elective units in third year to 3 units, and increasing PHED theory elective units in fourth year to 4½-7½.

4. Students intending to enter graduate studies should take Physical Education 371 and should discuss their total undergraduate programs with the Chairman of the Graduate Committee.

OPTIONS WITHIN THE B.P.E. PROGRAM

Students interested in completing the B.P.E. with an Option must receive program approval from the senior faculty adviser prior to registration each year.

EXERCISE SCIENCE

First and Second Years as above for B.P.E. Degree Program, with the following additional requirements.

1. In First and Second Years, students must complete (3) of the following courses: 3 units of First Year Biology, 3 units of First Year Mathematics, 3 units of First Year Physics, and/or 3 units of First Year Psychology, for a total of 9 units.
2. In addition to the courses listed in Number 1 above, 6 units must be selected from the following: Chemistry 110 or 120, Chemistry 203 or 230, 3 units of First Year Computer Science courses, Psychology 200, or Sociology 200. These 6 units must be completed by the end of Second Year.
3. The Second-Year English requirement should be completed in Second Year, except where prerequisite courses for non-PHED electives are required in Second Year. If not taken in Second Year, English shall be completed in Third Year.

Third Year (17½ units)	**Units**
Physical Education 363	1½
Physical Education 364	1½
Physical Education 370	1½
Physical Education 382	1½
PHED Theory Electives (1 course)	1½

Elective (non-PHED) or English, if not taken in Second Year	3
PHED Performance Course	1
Electives (PHED Theory, non-PHED)	6

Fourth Year (17½ units)	**Units**
Physical Education 371	1½
Physical Education 384	1½
Physical Education 463	1½
Physical Education 468	1½
Physical Education 499	1½
PHED Performance Course	1
Electives (PHED Theory, non-PHED)	9

SPORT STUDIES

First and Second Years — as above for B.P.E. Degree Program, with the following additional requirements:

1. In First Year, students must complete one of History 101, 120, 122, 125, 135 (3 units) and Sociology 200 (3 units).
2. In Second Year, students must complete Sociology 210 (3 units) and 3 units of Arts electives (see Note 1 below).

Third Year (17½ units)	**Units**
History 329	3
Physical Education 360	1½
Physical Education 370	1½
Physical Education 380	1½
Physical Education 381	1½
One of: PHED 363, PHED 384 PHED 463, PHED 468	1½
PHED Performance Course	1
Arts elective (see Note 1 below)	3
Electives (PHED Theory, non-PHED)	3

Fourth Year (17½ units)	**Units**
Physical Education 371	1½
Physical Education 382	1½
Physical Education 489	1½
Physical Education 499	1½
One of: PHED 363, PHED 384 PHED 463, PHED 468	1½
PHED Performance Course	1
Arts electives (see Note 1 below)	6
Electives (PHED Theory, non-PHED)	3

Notes:

1. Arts electives shall be chosen to complete the requirements for a second concentration in History or Sociology. Students are advised to choose from the following:

   History 9 units selected from History 303, 313, 315, 316, 326, 328, 334, 370, 404, 418, 425, Classical Studies 331, Medieval Studies 200, or Geography 327/328.

   Sociology 9 units from: 310, 354, 361, 410, 453, 462.

SPECIALIZATIONS WITHIN THE B.P.E. PROGRAM

Students interested in completing the B.P.E. with a Specialization must receive program approval from the Senior Faculty Adviser prior to registration each year.

AQUATICS

The specialization in aquatics requires that students complete a minimum of 12½ units as prescribed below. Prerequisite to the specialization is PHED 231 or bronze medallion award (R.L.S.S.C.).

Required Aquatic Courses

	Units
Performance and Performance Analysis:	
PHED 233	1
Two of: PHED 330, 331, 332, 333	2
PHED 430	1
Theory:	
PHED 234	1½
One of: PHED 455, 499	1½
PHED 363, 368 and 369	4½
Electives:	
One of: PHED 232, 330, 331, 332, 333, 430	1
	12½

DANCE

The Dance specialization consists of 9½ units of study in dance as prescribed hereunder:

Required Dance Units

	Units
Performance and Performance Analysis Courses:	
PHED 240	1
PHED 241	1
PHED 245	1
One of PHED 242/244	
PHED 341	1
PHED 441	1
Theory Courses:	
PHED 340	1½
PHED 448	1½
One of 348/343	1½
	9½

Recommended electives: Anthropology 200, Theatre 120, PHED 363, 201, Theatre 200, 230, 301, PHED 499. ..... 10½

GYMNASTICS

The Gymnastics specialization consists of a minimum of five (5) courses as prescribed hereunder:

Required Courses

	Units
PHED 201	1
PHED 202	1
One of PHED 301 or 302	1
One of PHED 402 or 499 (in gymnastics)	1-1½

Electives

One of the following courses:
PHED 204, 241, 341, 363, 441,
PHIL 311

REQUIREMENTS FOR A CONCENTRATION IN PHYSICAL EDUCATION FOR STUDENTS ENROLLED FOR THE BACHELOR OF EDUCATION DEGREE

Students interested in a Bachelor of Education Degree with a physical education concentration should look for information in the Faculty of Education section of the Calendar.

Specific reference should be made to the Admission Section, and the Physical Education Concentration in both the Elementary Education and Secondary Education program. Further information can be obtained from the office of Teacher Education.

THE BACHELOR OF RECREATION EDUCATION DEGREE (69 units)

This program has been discontinued. Students interested in alternative programs in leisure studies should consult a senior adviser in the School of Physical Education and Recreation.

Students currently registered in the program may continue but should consult a senior adviser in order to ensure that requirements for the degree are completed by 1988.

The B.R.E. degree will be awarded on completion of a minimum of 69 units of approved course work. Degree requirements: Leisure Studies Core 4½ units; Professional Core 12 units; Courses required outside of the Department 25½ units; Electives 27 units.

Third Year (16½-18 units)	
Recreation 301	1½
Recreation 375	1½
Recreation 395	1½
Recreation 396	1½
English 301	1½
Political Science 302	3
Psychology 308	3
Sociology 380	1½
Electives: See Notes	1½-3

Fourth Year (16-18 units)	
Recreation 492	1½
Recreation 496	3
Community and Regional Planning 425	1½
Electives: See Notes	10-12

* Psychology 206 may be substituted for Psychology 100 in the Second Year.

1988-89

Notes:

Students must elect 3 units from the science courses listed below and 3 units from the recreation program areas listed below. It is expected that these 6 units of electives should be completed by the end of Second Year. Of the remaining 21 units of electives students must elect at least 12 units from an area of emphasis listed below. These 21 units of electives should be chosen in consultation with and subject to the approval of a Faculty Adviser.

Science Courses: Biology 101 or 102, 310, 311, 313, Botany 310, Chemistry 103, 110, 120, Computer Science 101, 114, 116, 118, 200, Geography 101, Geology 105, 107, Mathematics 100, 101, 111, 130, Physics 110, 115, 120, 140, Statistics 105.

Recreation Program Areas: Physical Education, Art (Art Education or Fine Arts), Music (Music Education or Music), or Theatre.

Areas of Emphasis:

Administration — Two courses are required of all students in this area: Economics 100 or 309 and Commerce 457 and 458. Other courses are Recreation 461, Recreation 499, Computer Science 101, 114, 116, 118 or 200, Commerce 220, 261, 322, Economics 350, 360, 361, 370.

Therapeutic Recreation — One course is required of all students in this area: Recreation 365. Other courses are Recreation 366, 367, 461, and 499, Education 312, 318, 403, 429, Home Economics 210, 414, Physical Education 262, 362, Psychology 300, 322, Sociology 368, 473.

Requirements for the Degree of M.P.E.

Prerequisites: Bachelor's degree in physical education, Kinesiology, or other related field of study with standing as indicated in the Admission Requirements for the Master's degree (see the Faculty of Graduate Studies).

M.P.E. Course: a total of 18 units with or without a thesis, required advanced courses in Physical Education, and courses in other departments.

Requirements for the Degree of M.Ed.

Students holding a B.Ed. degree, with a major in Physical Education, who have been accepted for the M.Ed. degree, may with the approval of the Graduate Division of the Faculty of Education, enrol for a program of advanced studies in Physical Education. (See the Faculty of Graduate Studies).

1986-87

THE SCHOOL OF REHABILITATION MEDICINE

(A school within the Faculty of Medicine)

ACADEMIC STAFF

JOHN H. V. GILBERT, M.S., Ph.D. (Purdue), L.C.S.T., Dip. Phon., Professor and Acting Director.
TALI A. CONINE, B.Sc. (P.T.), M.A. (N.Y.U.), D.H.S. (Indiana), Professor.
W. JANE HUDSON, Dip. Physiotherapy, Dip. Teaching Physiotherapy (Toronto), B.P.T. (Manitoba), Associate Professor.
LYN JONGBLOED, Nat. Dip. Occupational Therapy (Pretoria, S. Africa), B.Sc. (O.T.) (Western Ontario), M.A., Ph.D. (Brit. Col.), Assistant Professor.
LEAH N. QUASTEL, Dip. Occupational Therapy and Physiotherapy (McGill), B.A. (Sir G. Williams), M.A. (Brit. Col.), Assistant Professor.
N. JEAN WESSEL, B.Sc. (Phys. Ther.) (McGill), M.H.Sc. (McMaster), Ph.D. (Alta.), Assistant Professor.
SUSAN RYAN, Dip. (O.T.) (N.Z.), B.S.R. (O.T.) (Brit. Col.), Senior Instructor and Head, Division of Occupational Therapy.
ELIZABETH DEAN, B.S., Dip. O.T. (Manitoba), M.S. Phys. Ther. (U.S.C.), Instructor.
ELISABETH S. BOTMAN, B.Sc. (Phys. Ther.) (McGill), M.Ed. (Manitoba), Instructor I.
DEIRDRE M. S. WEBSTER, Dip. Physiotherapy (England), B.S.R. (P.T.), M.Sc. (Brit. Col.), Instructor, part-time.
D. JANE O'CALLAGHAN, B.S.R. (Brit. Col.), Instructor.
D. JEAN STRACHAN, B.S.R. (Brit. Col.), Lecturer.

List of Clinical Faculty of School of Rehabilitation Medicine:
I. ABBOTT, P.T., Vernon Hospital.
D. ANDERSON, P.T., Mount St. Joseph Hospital.
J. ANSON, O.T., South Community Care Team.
V. BEARPARK, O.T., Campbell River and District General Hospital.
M. BOZZER, O.T., Mount Pleasant Community Care Team.
A. BREMNER, O.T., Psychiatric Unit, H.S.C.H.
S. BRESSLER, O.T., Children's Hospital.
P. BROOKMAN, P.T., Nanaimo Regional General Hospital.
C. BUSBY, O.T., Arthritis Society.
P. BUSTAMANTE, O.T., Shaughnessy Hospital.
K. CALSAFERRI, O.T., Vancouver General Hospital.
M. CHARLTON, P.T., Chilliwack General Hospital.
R. CHISHOLM, O.T., Royal Inland Hospital.
M. J. CLARK, O.T., Lions Gate Hospital.
F. CLUETT, P.T., Metropolitan Home Care, Vancouver Health Dept.
R. CORBETT, O.T., St. Paul's Hospital.
S. CORY, P.T., Richmond General Hospital.
D. DAESCHEL, O.T., Lions Gate Hospital.
B. DENFORD, P.T., Arthritis Society.
D. DICKSON, O.T./P.T., Lions Gate Hospital.
S. DIMOFF, O.T., Psychiatric Unit, H.S.C.H.
B. DUCKWORTH, O.T., G.F. Strong Rehabilitation Centre.
G. ENI, P.T., Health Sciences Centre Hospital.
L. ERVIN, P.T., Surrey Memorial Hospital.
G. FEARING, O.T., Health Sciences Centre Hospital.
B. FLEISCHAUER, P.T., Gorge Road Hospital.
D. FOSTER, P.T., Royal Jubilee Hospital.
A. GALBRAITH, P.T., Shaughnessy Hospital.
H. GHARIBIANS, P.T., Private Practice.
H. GIBSON, P.T., Royal Jubilee Hospital.
D. GLOVER, P.T., Burnaby Hospital.
E. HAWKES, O.T., Consultant.
G. HOBBS, P.T., Health Sciences Centre Hospital.
T. HOPKINS, P.T., Sports Medicine Clinic, U.B.C.
A. HOTTER, P.T., Holy Family Hospital.
S. ILES, O.T., Gorge Road Hospital.
P. JEACOCKE, P.T., Vancouver General Hospital.
J. JENNINGS, O.T., St. Vincent's Hospital.
J. JOHNSTON, P.T., St. Paul's Hospital.
M. JOHNSTON, P.T., Lions Gate Hospital.
M. JONES, O.T., Valleyview Hospital.
S. JORDEN, P.T., Variety's Treatment Centre.
S. KENWORTHY, O.T./P.T., St. Vincent's Hospital.
S. LAUGHLIN, O.T., Shaughnessy Hospital.
D. LISTER, O.T., Burnaby Hospital.
A. F. LOCKINGTON, O.T., Consultant.
S. LOWE, P.T., Holy Family Hospital.
B. LUNDGREN, P.T., Acute Care Unit, H.S.C.H.
L. McCLOY, O.T., Arthritis Society.
A. McGINITY, O.T., Valleyview Hospital.
S. MANNELL, P.T., St. Paul's Hospital.
M. MANNIS, P.T. Woodland's.
K. MARSHALL, O.T., Kelowna Mental Health Centre.
C. M. MELNICK, O.T., West Side Community Care Team.
B. MEREDITH, O.T., Riverview Hospital.
P. MUI, P.T., Mount St. Joseph's Hospital.
D. MYLOD, P.T., Richmond General Hospital.
D. NEEN, O.T./P.T., Sunny Hill Hospital for Children.
S. NEILSON, O.T., Prince Rupert Regional Hospital.
C. NISSEN, P.T., Shaughnessy Hospital.
G. PAGE, P.T., Workers' Compensation Board.
C. M. POUR, P.T., Vancouver General Hospital.
C. PRINS, P.T., Royal Columbian Hospital.
C. REUTER, P.T., Kelowna General Hospital.
J. RIHELA, O.T., Royal Columbian Hospital.
B. ROBINSON, O.T., Holy Family Hospital.
L. ROXBOROUGH, O.T., Sunny Hill Hospital for Children.
H. RUMBLE, P.T., Private Practice.
B. SAUNDERS, O.T., Shaughnessy Hospital.
K. SCALZO, O.T., Consultant.
J. SCHOONDERWOERT, O.T., Arthritis Society - Penticton.
L. SCOFFHAM, P.T., Trail Regional Hospital.
C. SHAW, P.T., Lions Gate Hospital.
R. SIMPSON, O.T., Variety's Treatment Centre for Children.
N. SKODIAK, O.T., Burnaby Mental Health Centre.
C. SMITH, P.T., Sports Medicine Clinic, U.B.C.
J. STEEL, P.T., Royal Columbian Hospital.
J. STEPHENS, O.T., Vancouver General Hospital.
S. STEWART, O.T., Nanaimo Regional Hospital.
B. STORCH, O.T., Royal Columbian Hospital.
P. STRAATHOF, O.T., Queen Alexandra Hospital for Children.
M. SUTO, O.T., St. Paul's Hospital.
B. ten HOOPE, O.T., Shaughnessy Hospital.
M. THOMAS, P.T., Workers' Compensation Board.
B. TILLOTSON, P.T., G.F. Strong Rehabilitation Centre.
Y. TOPF, O.T., Kelowna General Hospital.
T. WHITE, O.T., Burnaby Mental Health Centre.
V. WHITE, Research Therapist, Arthritis Society.
C. WILCOX, P.T., Greater Victoria Hospital Society.
K. VANDERHOOP, P.T., St. Mary's Hospital.

THE SCHOOL OF REHABILITATION MEDICINE

Programs Offered:
Bachelor of Science in Occupational Therapy — B.Sc. (O.T.)
Bachelor of Science in Physical Therapy — B.Sc. (P.T.)

Occupational therapy and physical therapy are health professions concerned with the prevention of dysfunction and rehabilitation of the sick and injured. Therapists serve as members of the rehabilitation team associated with physicians, nurses, social workers, teachers, speech pathologists, and psychologists. They work in hospitals, rehabilitation centres, psychiatric institutions, industrial facilities, government and voluntary health agencies, schools, homes for the aged, and in clients' homes.

Occupational therapists provide service to individuals whose abilities to cope with tasks of living are threatened or impaired by developmental deficits, the aging process, poverty and cultural differences, physical injury and illness, or psychological and social disability. Reference to occupation in the title is in the context of man's goal-directed use of time, energy, interest and attention. Occupational therapists use selected activity to evaluate and to treat dysfunction. The activities may include manual and creative arts, industrial and vocational skills, recreational activi-

ties, remedial games, communication skills, play for children, and training of clients in the use of adaptive equipment.

The services of physical therapists are primarily directed toward the prevention or alleviation of movement dysfunction. The more common movement dysfunctions may be manifested in impairment, actual or potential, related to a clients' neuromuscular, musculo-skeletal, respiratory or cardiovascular systems. Physical therapists evaluate functional impairment of their clients which may have resulted from developmental deficits, the aging process, disease, injury or psychological stress. Treatment programs are planned and implemented that may employ measures to alleviate pain, improve physical fitness and promote optimal movement function. Treatment methods may include therapeutic exercise, physical agents such as heat or electricity and the instruction of clients and their families in the use of appropriate activities or assistive devices to achieve the tasks of daily living.

General Information

Both degrees represent completion of four years of post-secondary education. The first year may be taken at the University of British Columbia, a community college or another university. The second, third and fourth years are taken in the School of Rehabilitation Medicine and approved clinical facilities in British Columbia and across Canada. It is not feasible at the present time to offer studies on a part-time basis or to offer advance standing other than the pre-requisite courses.

Admission

Application for admission to the second year of the School of Rehabilitation Medicine will be considered for an applicant who has completed a full year of university or college study with an overall minimum achievement of 70% (G.P.A. 2.8) including the following subjects, or the equivalent: English 100, Biology 101 or 102, Chemistry 103 or 110 or 120, Mathematics 130, or 100 and 101 or 140 and 141, or 111 or Statistics 203 and 204, Psychology 100.

Admission to second year Rehabilitation Medicine is limited and based on completion of pre-requisites, academic standing, maturity and personal suitability. Two letters of reference are required (one must be from a volunteer/work experience in a rehabilitation setting). Primary consideration is given to well-qualified residents of British Columbia. Students will be notified if they qualify for a personal interview.

The School reserves the right of selection of all students admitted; and to limit enrolment if its facilities and resources are inadequate.

Physical Fitness Requirements

Each applicant must present a certificate of physical fitness from a physician in accordance with the regulations of the Student Health Service.

Application

All inquiries and requests for application forms should be addressed to: The Director, The School of Rehabilitation Medicine, The University of British Columbia, T106 Third Floor - Acute Care Unit, 2211 Wesbrook Mall, Vancouver, B.C. V6T 1W5. All parts of the application are to be completed and submitted to the School no later than February 28, with the single exception of final official post-secondary transcripts which must be submitted no later than June 15.

Costs other than Sessional Fee

There are additional expenses for uniforms, travel, clinical fieldwork and books. The School will provide applicants with information regarding these additional costs. Students should be prepared to have clinical fieldwork outside the Vancouver area and therefore should include travel costs and accommodation for this experience in estimating total expenses. Students are encouraged to have access to a car for transportation in order to minimize time and effort expended in essential travel to the various areas used for clinical fieldwork.

Laboratory fee: $100.00 per year payable on registration day.

English Composition Requirement:

To qualify for the degree of Bachelor of Science in Occupational Therapy or Bachelor of Science in Physical Therapy students must satisfy the English Composition requirement of the School of Rehabilitation Medicine. To do this, students must obtain credit for English 100 and must pass the English Composition Test (ECT). Each student must attach a fee sticker to the ECT booklet. Each student is allowed a "Fee Waived" sticker for the first sitting, for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services.

Students (including Transfer Students) who have obtained credit for English 100 or Arts One but who have not passed the Composition Test will write it in late September. The test will also be given during the December examination period, in late March or April and in July. Students who have not satisfied the requirement at the time of admission to the program must do so within one academic year of admission to the School of Rehabilitation Medicine.

Bachelor of Science in Occupational Therapy — B.Sc. (O.T.)

Second Year

Anatomy 390, Basic Human Anatomy	2 units
Anatomy 392, Gross Anatomy of the Limbs and Trunk	2 units
Pathology 375, Introduction to Human Pathology	1 unit
Psychology 301, Developmental Psychology	3 units
Zoology 303, Vertebrate Physiology	3 units
OR	
Physiology 301, Human Physiology	3 units
Sociology 200, Introduction to Sociology	3 units
RHME 201, Kinesiology	1½ units
RHME 202, Clinical Skills	½ unit
RHME 204, Tests and Measures	1½ units
RHME 205, Devices/Equipment	1½ units
RHME 207, Occupational Therapy, Theory and Practice	3 units
RHME 209, Clinical Fieldwork	0 units

By April 30 of second year, all students are required to show evidence of:

1. a valid first aid certificate (e.g. St. John's) or equivalent competence:
2. a valid Basic Cardiac Life Support (BCLS) Basic Level I certificate coordinated through the Justice Institute of B.C., Emergency Health Services. **In addition, students will be required to show proof of re-certification of the BCLS Basic Level I certificate on an annual basis prior to commencing clinical fieldwork.**
3. completion of the recommended medical terminology programmed text.

Third Year

Elective	3 units
Anatomy 425, Elements of Neuroanatomy and Physiology 425, Elements of Neurophysiology	3½ units
OR	
RHME 420, Elements of Neuroanatomy and Neurophysiology	3½ units
RHME 301, Medicine and Surgery I, II, III, IV	3 units
RHME 302, Psychosocial Aspects of Disability	1½ units
RHME 303, Occupational Therapy, Clinical Conditions in Psychiatry	2 units
RHME 306, Occupational Therapy, Orthotic and Remedial Equipment	1 unit
RHME 307, Occupational Therapy, Psychosocial Dysfunction	1½ units
RHME 311, Leadership and Communication	1 unit
RHME 323, Occupational Therapy in Neurorehabilitation	1½ units
RHME 335, Clinical Fieldwork	3 units

Fourth Year

RHME 401, Medicine and Surgery V	½ unit
RHME 402, Introduction to Scientific Inquiry	1½ units
RHME 407, Occupational Therapy, Advanced Problem-Solving for Physical Dysfunction	1½ units
RHME 408, Management and Administration	1 unit
RHME 416, Occupational Therapy, Vocational Rehabilitation	1½ units
RHME 417, Health Care Systems	½ unit
RHME 418, Occupational Therapy, Rehabilitation Technology	1 unit
RHME 424, Occupational Therapy, Program Design	1 unit
RHME 425, Occupational Therapy, Social and Professional Issues	0 unit
RHME 426, Occupational Therapy, Independent Study	1½ units
OR	
RHME 436, Occupational Therapy, Ergonomics and Organization of Activity	1½ units
RHME 428, Occupational Therapy, Advanced Problem-Solving for Mental Health	1½ units
RHME 435, Clinical Fieldwork	3½ units

Bachelor of Science in Physical Therapy — B.Sc. (P.T.)

Second Year

Anatomy 390, Basic Human Anatomy	2 units
Anatomy 392, Gross Anatomy of the Limbs and Trunk	2 units
Zoology 303, Vertebrate Physiology	3 units
OR	
Physiology 301, Human Physiology	3 units
Pathology 375, Introduction to Human Pathology	1 unit
Psychology 301, Developmental Psychology	3 units
Sociology 200, Introduction to Sociology	3 units
RHME 201, Kinesiology	1½ units
RHME 202, Clinical Skills	½ unit
RHME 204, Tests and Measures	1½ units
RHME 205, Devices/Equipment	1½ units

RHME 206, Physical Treatment of the Musculo-skeletal System . 1 unit
RHME 208, Physical Assessment of the Musculo-skeletal System . 1½ units
RHME 210, Clinical Fieldwork . . . . . 0 units

By April 30 of second year, all students are required to show evidence of:

1. a valid first aid certificate (e.g. St. John's) or equivalent competence:
2. a valid Basic Cardiac Life Support (BCLS) Basic Level I certificate coordinated through the Justice Institute of B.C., Emergency Health Services. **In addition, students will be required to show proof of re-certification of the BCLS Basic Level I certificate on an annual basis prior to commencing clinical fieldwork.**
3. completion of the recommended medical terminology programmed text.

Third Year

Elective, selection to be approved by Division of Physical Therapy 1½ units
Anatomy 425, Elements of Neuroanatomy . . . . . .
AND
Physiology 425, Elements of Neurophysiology . . . . . 3½ units
OR
RHME 420, Elements of Neuroanatomy and Neurophysiology . . 3½ units
RHME 301, Medicine and Surgery I, II, III, IV . . . . . 3 units
RHME 302, Psychosocial Aspects of Disability . . . . . 1½ units
RHME 304, Physical Therapy, Musculo-skeletal Assessment and Treatment Skills. . . . . 1 unit
RHME 305, Physical Therapy, Electro and Hydrotherapy . . . . 1½ units
RHME 308, Principles of Physical Therapy Management of the Musculo-skeletal System . . . . . 1 unit
RHME 311, Leadership and Communication . . . . . 1 unit
RHME 313, Physical Therapy Management of the Respiratory System. . . . . 1 unit
RHME 314, Physical Therapy Management of the Neuromuscular System . . . . . 1½ units
RHME 330, Clinical Fieldwork. . . . . 4½ units

Fourth Year

RHME 401, Medicine and Surgery V . . . . . ½ unit
RHME 402, Introduction to Scientific Inquiry . . . . . 1½ units
RHME 405, The Application of Advanced Instrumentation and Computer Technology in Physical Therapy . . 1 unit
RHME 408, Management and Administration . . . . . 1 unit
RHME 411, Physical Therapy Management of the Integumentary, Genitourinary and Reproductive Systems . . . . 1 unit
RHME 412, Physical Therapy Management of the Cardiovascular and Peripheral Vascular Systems . 1 unit
RHME 413, Physical Therapy, Comprehensive Patient Management 3½ units
RHME 414, Physical Therapy, Social and Professional Issues . . 0 unit
RHME 415, Physical Therapy, Independent Study . . . . . 1½ units
RHME 417, Health Care Systems . . . . . ½ unit
RHME 430, Clinical Fieldwork. . . . . 3½ units

Attendance:

1. Students are expected to attend all lectures and laboratory periods in each course. Admission to lectures or laboratories and credit for attendance may be refused by an instructor for lateness, misconduct, inattention or neglect of duty.
2. A student absent from classes because of illness must comply with the regulations of the Student Health Service.
3. If unavoidably absent for clinical placements, a student is required to notify the hospital and the School.

Examinations and Advancement:

1. Examinations in the School of Rehabilitation Medicine may be held at various times thoughout the year, final examinations being written at the end of each academic year. These examinations are obligatory for all students.
2. If a student is unavoidably absent from a sessional examination, he/she must notify the School of Rehabilitation Medicine office before the end of the examination period. Failure to observe this rule may result in the recording of a failure for the course.
3. When a sessional examination has been missed application for a deferred examination or for special consideration must be made in writing to the School of Rehabilitation Medicine office not later than forty-eight hours after the close of the examination period. If the absence was for reasons of health, a physician's certificate indicating the nature and duration of the illness must be submitted to the Student Health Service.
4. A student may be denied the privilege of writing a sessional examination in any subject because of unsatisfactory work or attendance, and may be considered to have failed in the course.
5. In any course which involves both laboratory work and written examinations, a student is required to make satisfactory standing in both parts. If the course is repeated, no exemption will ordinarily be granted from the work in either part.
6. Term essays and examination papers may be refused a passing mark if they are illegible or noticeably deficient in English.
7. The minimum passing mark in any Rehabilitation course is 60%. Examinations will be graded as follows: First Class—80%; Second Class—65%; Pass—60%; Fail—below 60%.

The Promotions Committee will determine a student's fitness for promotion at the end of each academic year.

A student whose academic standing is unsatisfactory, may be required to withdraw from the School or be required to repeat the work of the entire year.

If the progress of the student has been unsatisfactory, the School may permit a supplemental examination in the subject failed, provided that: (i) the courses failed total, in second and fourth year, not more than 6 units or, in third year, not more than 6½ units; (ii) an average of at least 60% in the work of the year including the failed subjects has been obtained .

The Division may direct such work as will be necessary to prepare for the supplemental examination. It is the responsibility of the student to consult the Heads of the Divisions concerned about such arrangements.

If the student satisfies the requirements of the Division concerned and passes each supplemental examination with a mark of at least 65% the student will be promoted.

A student in the second year who fails to be promoted will not be permitted to repeat the year except under special circumstances. A student who fails a supplemental(s) examination(s) in third year will be required to repeat the failed course(s) and all others in which 65% was not achieved, before being allowed to proceed to fourth year. A student who fails a supplemental(s) examination(s) in fourth year may be given a further examination before being required to repeat that course.

A student will not be permitted to repeat more than one year except under special circumstances. A student who repeats a year is required to attain a mark of at least 65% in the examination in each subject.

Clinical Experience:

Clinical Practice: Fieldwork in professionally accredited facilities will be supervised by University appointed personnel. Clinical fieldwork in either occupational therapy or physical therapy will be provided in facilities such as hospitals, health clinics, community care agencies, and rehabilitation centres. From 4 to 8 weeks clinical fieldwork out of the Vancouver area is required. Students are responsible for any expenses involved.

RHME 210/209 (4 weeks/8 weeks) — A student failing to complete these courses satisfactorily may be granted permission to advance to Third Year only on the recommendation of the Promotions Committee.

RHME 330/335 (18 weeks/12 weeks) — A student must receive a passing grade in each section of 330 or 335 before being granted permission to proceed to Fourth Year.

RHME 430/435 (14 weeks/14 weeks) — A student must receive a passing grade in each section of 430 or 435 before being eligible for graduation.

If a supplemental is granted in any section of a clinical fieldwork course, or if a student misses a complete fieldwork experience due to accident or illness, the section must be repeated and completed successfully before a student can be eligible for graduation.

On completion of all academic courses and clinical fieldwork, the graduate will be eligible for membership in both the provincial and national associations. For physical therapy graduates these are the Physiotherapy Association of British Columbia (P.A.B.C.) and the Canadian Physiotherapy Association (C.P.A.) and for the occupational therapy graduates these are the British Columbia Society of Occupational Therapists (B.C.S.O.T.) and the Canadian Association of Occupational Therapists (C.A.O.T.).

Dual Qualifications

Those students who have completed a University of British Columbia degree in Occupational Therapy or Physical Therapy and who wish to become dually qualified will be required to complete 25 designated units in the Occupational Therapy Program or 24½ designated units in the Physical Therapy Program as outlined below.

1986

Bachelor of Science in Occupational Therapy - B.Sc. (O.T.)

Required courses in occupational therapy to be completed by School of Rehabilitation Medicine graduates holding The University of British Columbia degree B.Sc. (P.T.).

RHME 207	(3)	RHME 303	(2)	RHME 407	(1½)
		RHME 306	(1)	RHME 416	(1½)
		RHME 307	(1½)	RHME 418	(1)
		RHME 323	(1½)	RHME 424	(1)
		Elective	(1½)	RHME 425	(0)
				RHME 426 OR	
				RHME 436	(1½)
				RHME 428	(1½)
Clinical Fieldwork:					
RHME 209	(0)	RHME 335	(3)	RHME 435	(3½)

Bachelor of Science in Physical Therapy - B.Sc. (P.T.)

Required courses in physical therapy to be completed by School of Rehabilitation Medicine graduates holding The University of British Columbia degree B.Sc. (O.T.).

RHME 206	(1)	RHME 304	(1)	RHME 405	(1)
RHME 208	(1½)	RHME 305	(1½)	RHME 411	(1)
		RHME 308	(1)	RHME 412	(1)
		RHME 313	(1)	RHME 413	(3½)
		RHME 314	(1½)	RHME 414	(0)
				RHME 415	(1½)
Clinical Fieldwork:					
RHME 210	(0)	RHME 330	(4½)	RHME 430	(3½)

STUDENTS ARE REMINDED THAT THE GENERAL POLICY OF THE UNIVERSITY OF BRITISH COLUMBIA AS TO ADMISSION AND REGISTRATION WILL BE FOLLOWED.

1986-87

THE FACULTY OF SCIENCE

ACADEMIC STAFF

Office of the Dean

R. C. MILLER JR., B.Sc. (Trinity College), M.Sc. (Penn State), Ph.D. (Penn.), Professor of Microbiology and Dean of the Faculty.
D. H. DOLPHIN, B.Sc., Ph.D. (Nottingham), Professor of Chemistry and Associate Dean of the Faculty.
N. R. LILEY, M.A., D.Phil. (Oxon), Professor of Zoology and Assistant Dean of the Faculty.
M. McMILLAN, B.Sc., M.Sc. (Brit. Col.), Ph.D. (McGill), Professor of Physics and Assistant Dean of the Faculty.

Department of Biochemistry—See Faculty of Medicine.

Department of Botany

Professor and Head of the Department
A. D. M. GLASS, B.Sc. (Wales), Ph.D. (Brit. Col.), Director of the Herbarium.

University Professor
M. SHAW, M.Sc., Ph.D., D.Sc. (McGill), P.Ag., F.A.P.S., F.R.S.C.

Honorary Professors
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Department of Microbiology

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G. WEEKS, B.Sc., Ph.D. (Birmingham).

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W. D. RAMEY, B.Sc., Ph.D. (Brit. Col.).

Senior Instructor
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Associate Members
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P. M. TOWNSLEY, Professor, Food Science.
W. BOWIE, Assistant Professor, Medicine.
D. VAN ALSTYNE, Assistant Professor, Paediatrics.
C.-Y. G. LEE, Associate Professor, Obstetrics/Gynaecology.
D. P. SPEERT, Assistant Professor, Paediatrics.

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R. M. CLOWES, Professor, Geophysics and Astronomy.

1986-87

Department of Pharmacology and Therapeutics—See Faculty of Medicine.

Department of Physiology—See Faculty of Medicine.

Department of Physics

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D. LUDWIG, Professor, Mathematics/Animal Resource Ecology.
M. L. PUTERMAN, Associate Professor, Commerce.
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Associate Members
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J. MYERS, Associate Professor, Animal Resource Ecology and Plant Science.
T. G. NORTHCOTE, Professor, Animal Resource Ecology, Forestry and Westwater.
W. G. WELLINGTON, Professor of Plant Science and Animal Resource Ecology.

THE FACULTY OF SCIENCE

The B.Sc. degree can be earned in the following fields:

ASTRONOMY	GENERAL SCIENCE	OCEANOGRAPHY
BIOCHEMISTRY	GEOGRAPHY	PHARMACOLOGY
BIOLOGY	GEOLOGY	PHYSICS
BOTANY	GEOPHYSICS	PHYSIOLOGY
CHEMISTRY	MATHEMATICS	PSYCHOLOGY
COMPUTER SCIENCE	MICROBIOLOGY	ZOOLOGY

For information about the M.Sc. and Ph.D. degrees see Faculty of Graduate Studies section of the Calendar.

To earn a B.Sc. degree students must follow one of the following programs:

Honours: This program involves intense specialization in a single field or a combination of fields. It is the normal route to graduate study. It requires maintenance of a high academic standing and may involve preparation of a graduating thesis.

Major: This program involves specialization in a single field or a combination of fields. It may lead to graduate study if sufficiently high standing is obtained.

General: This program involves a broad education in science. It is not recommended for students who may want to go on to graduate study. However, with careful planning and sufficiently high standing it is possible to go on to graduate study, but this may require additional qualifying studies.

Part-time Program:
Some degree programs are amenable to part-time study. Students should inquire at the Office of the Dean for further information and direction in arranging a part-time study program.

Admission Requirements:
Apart from the usual university entrance requirements (see General Information section) students from Grade 12, British Columbia, are required to have completed satisfactorily Chemistry 11, Algebra 11 and 12, Physics 11 and at least one other Grade 12 Science course.

Applicants who cannot meet the requirements exactly as specified should submit a special appeal to the Office of the Registrar with their application forms. Consideration will be given to all appeals by the Dean, who has discretionary powers on admissions.

Students with educational documents issued outside the Province of British Columbia must pay an application for admission fee of $25.00. Students applying for admission from Secondary Schools outside the Province must meet the minimum requirements applied to graduates from British Columbia Secondary Schools for admission to Year Level I.

A student required to withdraw from another Faculty may be permitted to register only by special permission, and should consult the Office of the Dean. A student with unsatisfactory standing from another post-secondary institution will not be admitted.

Registration and Program Approval:
The following is only a summary of the registration procedures for science students. Complete information may be obtained from the brochure mailed to the students with their Authorization to Register forms.

a) *First-year students:* All first-year students must obtain program approval from an adviser designated by the Dean. Such program approval together with scheduling of courses and completion of registration will be carried out during Registration Week.

b) *Second, Third and Fourth-year students:* Students entering second and subsequent years must select a major, honours, or general program as outlined by the Faculty of Science. Students not meeting the academic standing required for compulsory courses in a given program may be required to withdraw from that program. In many instances changes from one program to another are possible in later years. Changes in program may result in lengthening the time to complete the B.Sc. degree. Students proposing to undertake an honours, pre-honours or major program must consult a departmental adviser designated by the department of their field of specialization. Students planning to undertake a general program must consult an adviser designated by the Dean. Returning students are advised to obtain program advice before the end of the second term. All study programs require approval by the Department(s) concerned. Students planning to study on a part-time basis must consult the Dean. With the approval of the Dean of the Faculty of Science, departments may require, as a prerequisite for entering a program, that a student obtain at least 60% in a specified first-year course basic to the field of the major, unless special permission is received from the Head of the Department.

c) *All years:* After two weeks of lectures, except in very special circumstances and with the permission of the Dean, students (whether full-time or part-time), may not change the program for which they are registered.

All changes in course registration must be made by students at the office of the Dean of Science. Program changes must be approved by the Head(s) of the Department(s) concerned and by the Dean's office. These changes will then be submitted to the Registrar's office by the Office of the Dean. Students may not take courses for which they have not registered, and may be considered as having failed in all courses dropped without permission.

Limitation of Enrolment:

It may be necessary to limit enrolment in certain courses in the Faculty of Science when the demand for these courses is greater than the resources available. Where limitations in enrolments become necessary, the criteria for implementation will normally be determined by academic considerations as suggested by the Head of the Department and approved by the Dean.

Credit:

The normal pattern for a full-time student is to take 15 units per winter session, usually consisting of 5 courses each of 3 units' value. Combinations of 1, 1½ and 2 unit courses are also quite normal. After 4 winter sessions the student with 60 units usually earns a B.Sc. degree. A full-time student must normally complete Graduation Requirements within seven calendar years following admission to Year Level I or its equivalent.

First year students at this University or students transferring to this University from another Institution must request permission from the Dean's Office in order to register for more than 15 units. No student may take more than 18 units per winter session without special permission of the Dean. **Students who fail a course in one winter session will not be allowed to attempt more than 15 units in their next winter session, except with special permission of the Dean.**

Students who register in the winter session for fewer than 15 units will normally be considered as part-time students and must have the permission of the Dean. Part-time students are urged to complete Graduation Requirements in a reasonably short time to avoid complications resulting from program changes, or from substantial changes in course material, or from both.

Students will not receive university credit for secondary school courses taken among the required credits or even as extra credits. They may receive advance placement, however, and students should consult the department(s) concerned.

Students transferring to the Faculty of Science from other faculties at the University of British Columbia must consult the Dean re transfer of credits to the B.Sc. degree.

Spring and Summer Session Credit:

These may be combined with Winter Session credit in a degree program with the approval of the Department or Faculty Adviser. These courses do not count as part of the full-time program in a Winter Session. Note that the maximum credit for any one Spring and Summer Session is 6 units, except with the permission of the Dean. It is not possible to take two laboratory science courses in the same Summer Session.

Faculty Requirements for B.Sc. (Graduation Requirements):

(a) General or Major program: 60 units. Honours program: 66 units.

(b) At least 36 units must be in Science courses. Only the following Geography courses may be considered as Science courses: GEOG 101, 202, 205, 301, 302, 303, 306, 308, 309, 313, 401, 402, 403, 405, 406, 409, 447, 449. In addition to Psychology 348 and 448, all Psychology courses numbered 60 or above in the last two digits have Science credit.

(c) At least 9 units must be Arts courses (i.e., English 100 and at least 6 other units in Arts courses). Some technique courses offered by the Faculty of Arts (especially in Fine Arts, Home Economics and Music) are not applicable. Only the following Geography courses can be used to fulfil the Arts requirement of the Faculty of Science: GEOG 190, 220, 260, 320, 324, 327, 328, 329, 345, 350, 351, 352, 357, 360, 361, 362, 363, 385, 386, 390, 394, 422, 423, 424, 425, 427, 450, 453, 457, 461, 464, 467, 468, 481, 483, 484, 491, 493, 494, 495, 497, 498, 499. The following Geography courses may be used as free electives, with due regard to prerequisites. They may not be used for either Science or Arts 'designated' credit: GEOG 110, 310, 315, 317, 370, 371, 372, 373, 374, 375, 410, 415, 417, 418, 445, 470, 471.

(d) At least 21 units of Arts and Science studies must be in courses numbered 300 or higher, and of these, at least 15 units must be in Science courses.

(e) Only Science and Arts courses may be counted for credit except with permission of the Dean. **NOTE:** Courses in Physical Education and Education cannot be counted for graduation credit and only a few specific courses in other Faculties are acceptable for credit with permission of the Dean and the Head of the Department. Students should consult their individual departments or the Dean of Science before registering for any courses that are not Arts or Science.

(f) Students are responsible for selecting a program that meets all the faculty and departmental requirements. Students who have interrupted their studies may find that requirements have changed since the period of their previous enrolment. They must consult the Dean and the Department involved.

(g) Students who are accepted by transfer from other institutions must normally complete all further courses at U.B.C. The University will not grant a degree for studies that represent less than the equivalent of two regular winter sessions (30 units). Transfer credit is not normally granted after completion of the first 30 units (33 units in an Honours program).

A student wishing to take courses at another institution and transfer the credit towards a B.Sc. degree must first obtain written permission from the Dean. It is the student's responsibility to see that an official transcript is forwarded to Admissions, Office of the Registrar.

English Composition Requirement

To qualify for the degree of B.Sc. students must satisfy the English Composition requirements of the Faculty of Science. To do this students must obtain credit for English 100 and must pass the English Composition Test (ECT). Each student must attach a fee sticker to the ECT booklet. Each student is allowed a "Fee Waived" sticker for the first sitting; for subsequent sittings a "Fee Paid" sticker must be purchased in advance ($10.00) from the Department of Financial Services.

Students (including students transferring from other institutions) who have obtained credit for English 100 but who have not passed the Composition Test will write it in late September. This Test will also be given during the December examination period, in late March or April, and in July. Students who anticipate difficulty passing the Test are advised to enrol in a remedial English course offered by the Centre for Continuing Education.

First Year:

Every first-year student must take (or have advance credit or placement in):

1. MATHEMATICS 100 and 101 (or 120 and 121)
2. CHEMISTRY 110 or 120
3. PHYSICS 110 or 115 or 120
4. ENGLISH 100

AND 5. Three units chosen from:

BIOLOGY 101 or 102
or GEOGRAPHY 101 or GEOLOGY 105
or GEOPHYSICS 120 plus GEOLOGY 125
or COMPUTER SCIENCE 114, 116 (101, 118) (See Note 1)
or an ARTS ELECTIVE. Suggested courses:

ANTHROPOLOGY 100, 200, 201, 202, 203, 204, 205, 206, 213, 214
ASIAN STUDIES 105, 115, 206, 225
CHINESE 100, 101
CLASSICAL STUDIES 100, 204, 210
CREATIVE WRITING 202
ECONOMICS 100
FINE ARTS 100, 125, 181, 225, 226, 251, 261, 281-290
FRENCH 100, 105, 110, 115, 120
GEOGRAPHY 190, 220, 260
GERMAN 100, 110, 120
GERMANIC STUDIES 201
GREEK 100, 125
HINDI 300, 310
HISTORY 101-171, 201-270
ITALIAN 100, 101
ITALIAN STUDIES 230
JAPANESE 100, 101, 102, 103
LATIN 100, 120
LINGUISTICS 100, 200
MEDIEVAL STUDIES 200
MUSIC 100, 103, 106, 120, 121, 200
PHILOSOPHY 100, 102, 115, 120, 201, 210, 214
POLISH 110
POLITICAL SCIENCE 200, 220, 240, 260, 280
PORTUGUESE 102
PSYCHOLOGY 100, 200, 206
RELIGIOUS STUDIES 100, 202, 204, 205
RUSSIAN 100
SANSKRIT 305
SLAVONIC STUDIES 105, 110, 206
SOCIOLOGY 100, 200, 210, 213, 214, 220, 230, 240
SPANISH 100, 110, 211
THEATRE 120, 200, 230
UKRAINIAN 325
URBAN STUDIES 200
WOMEN'S STUDIES 222, 224

Notes:

1. Certain Major and Honours programs require that the fifth course be in Science.

(a) Biology 101 or 102 is required in the First Year for a Major or Honours in the Life Sciences (Biochemistry, Biology, Botany, Microbiology, Pharmacology, Physiology, Psychology and Zoology).

(b) Computer Science 114 and 116 are required for a Major or Honours in Computer Science. Those eligible for Computer Science 118 may substitute it and a 1½-unit elective for Computer Science 114 and 116.

(c) General Program students should take Biology 101 or 102, or Geology 105, or Geography 101, or Geophysics 120 plus Geology 125 in their First Year.

(d) Geography 101 or Geology 105 is required for a Major or Honours in Geography.

(e) Geology 105 is required for a Major or Honours in Geology.

(f) Geophysics 120 plus Geology 125, or Geology 105 are required for a Major or Honours in Geophysics.

Students of good ability, especially those who wish to satisfy the prerequisites for a Major or Honours in two or more of the Life Sciences and/or Geological Sciences, are encouraged to take 18 units but require the approval of the Dean.

2. Students who intend to pursue an Honours Program are reminded that a number of Departments offer enriched first year courses as a foundation for such programs, e.g., Mathematics 120/121, Physics 120, special sections of Chemistry 120.

3. Students intending to enter Applied Science, Commerce, Forestry or Pharmaceutical Sciences after First Year should consult the Calendar for entrance requirements. These requirements must of course be included within the normal First Year program in the Faculty of Science.

4. Students intending to do graduate work in the Sciences are reminded that competence in the reading of scientific literature in one or two foreign languages is usually required. For Honours in Mathematics, one course at the University level in French, German, or Russian (or French 12 or German 12) is required before the graduating year.

5. Advance credit or placement may be granted where appropriate when the equivalent of any or all of these courses is completed at another institution prior to admission to the University.

Minimum Requirements for Promotion:

Promotion to Year Level II: Successful completion of a total of 9 or more units, of which 6 or more must be from the required Science units of Year Level I (Chemistry 110 or 120; Mathematics 100 and 101, (or 120 and 121); Physics 110 or 115 or 120).

Promotion to Year Level III: Successful completion of a total of 24 or more units which must include English 100, the 9 required Science units of Year Level I, and at least 7 additional Science units.

Promotion to Year Level IV: Successful completion of a total of 39 or more units of which 25 or more must be Science units.

Notes:

1. A student must meet the Minimum Requirements for Promotion to Year Level II within a maximum of 30 units of course work attempted, or be required to withdraw from the Faculty of Science.

2. A student must meet the Graduation Requirements for the B.Sc. degree within a maximum of **90** units of course work attempted, or be required to withdraw from the Faculty of Science.

3. Students applying for admission to Year Levels II and III from British Columbia Colleges and Universities or from institutions outside the Province must meet, in addition to the present University admission requirements, the Faculty of Science Minimum Requirements as applied to U.B.C. students for promotion to that stage.

Second, Third and Fourth Year:

Honours Program: Full-time students must consult the Head of the Department at the beginning of the Second Year and each subsequent year, since permission to enter an Honours program or to remain in an Honours program must be obtained from the Head of the Department(s) concerned before registration each year. In addition to meeting the specific department course requirements as described in the calendar, Honours candidates must complete 15 units with a minimum overall second-class standing (65%) in each academic year. Honours candidates are expected to complete the degree requirements within five academic years measured from the date of first registration, at a University or regional college. Honours students may, with the permission of the Department(s) concerned and the Dean, interrupt their studies for a period of one year. The Honours program is available, in certain degree programs, to part-time students only with permission of the Dean.

Major Program: Students must select courses in consultation with the departmental advisers at the beginning of the Second year and each subsequent year.

General Science Program: A student in the General Program who has completed the First year must select courses as follows:

(1) Biology 101 or 102; and one of Geography 101, Geology 105, or Geophysics 120 plus Geology 125, during the first two years.

(2) Of the minimum number of units in Science courses numbered 300 and above required in the Third and Fourth Years, at least 9 units must be taken in one area, at least 3 units in a different area, and at least 3 units in an area different from the preceding two. One of these three must be Life Sciences. Courses must be acceptable for Major or Honours programs in the specific areas of concentration. The five available areas are:

a. Chemistry
b. Physics
c. Mathematics and Computer Science (including Statistics)
d. Earth Science (Astronomy, Geography, Geology, Geophysics)
e. Life Science (Biochemistry, Biology, Botany, Microbiology, Pharmacology, Physiology, Psychology, Zoology).

(3) Students in Second Year must register in the courses which are prerequisite to the Third Year courses of their proposed areas of concentration (see 2 preceding).

Students who have exceptionally good records from their first two years in the Faculty may instead, with special permission of the Dean, choose to complete nine (9) units of courses numbered 300 or higher in each of two (2) of the five areas of the Faculty listed above.

Part-time Program: Students should select courses and programs in consultation with the Departmental advisers and Office of the Dean prior to the winter session each year.

Examinations:

Formal written examinations (scheduled by the Registrar) are required at the end of all courses terminating in December or in April, and also in December for courses continuing all year. The formal written examination may be replaced by alternative examination procedures only at the discretion of the Head of the Department and with the permission of the Dean.

A passing grade is 50% or higher; Second class is 65% to 79%; First class is 80% to 100%.

Passing the final examination may not in itself be sufficient to pass a given course. Students may be denied a passing grade for unsatisfactory work during the session or if their essays, laboratory reports or exam papers are deficient in English. **Furthermore, in any Science course which has both laboratory work and written examinations, students must complete and pass both parts to pass the course.** A student who fails the laboratory work may not be allowed to sit for the final written examination.

Regular attendance is expected of students in all their classes (including lectures, laboratories, tutorials, seminars, etc.). Students who neglect their academic work and assignments may, on the recommendation of the Head of the Department, be excluded by the Dean from the final examinations.

In general students who pass a course can use it as a prerequisite for a subsequent course in that subject. However departments do have the right to bar entrance to their third year courses to students who obtain only 50% in their second year prerequisite course or courses. Students should request permission from the Dean to write the supplemental examination for higher standing if it is necessary for them to use the course as a prerequisite.

Unsatisfactory Standing:

Fail standing will be assigned in a session where a student who is taking more than 6 units either

(i) passes fewer than 9 units (or 60% of the units attempted, whichever is less); or

(ii) does not pass in 15 units (or all units attempted, whichever is less) AND does not obtain an overall average of at least 60% in at least 60% of the units attempted.

Where a student is taking 6 or fewer units, fail standing will be assigned if more than 50% of the units attempted are failed.

First and Second Year students who fail a year will not be permitted to re-enrol at U.B.C. to repeat the studies of the failed year. They will be considered for re-admission if they have completed satisfactorily (C+ average or better) at least two semesters (equivalent to U.B.C. 15 units) at a college subsequent to their failure at U.B.C. Failed Second Year students who have completed 18 or more units of college or University courses, should consult the Office of the Dean to determine the number of college units required for readmission.

Third and Fourth Year students who fail a year and are forced to discontinue may be re-admitted at a later date if their appeal is granted by the Faculty of Science.

A student who fails a year but passes in some courses can consider the passed subject matter completed and may go on to more advanced work in those passed subjects if and when permitted to re-enrol in the Faculty of Science.

A student in any year who fails for the second time either in repeating a year or in a later year, will be required to withdraw. Readmission of a student in these circumstances would require approval of the Faculty of Science and ratification by the Senate Admissions Committee.

A student taking a full program who obtains credit for only 9 units will be re-admitted on probation but during the subsequent session may be required to withdraw at any time for unsatisfactory progress.

Any student whose academic record is unsatisfactory, as determined by tests and examinations of the first term, may be required to withdraw for the remainder of the session.

The Senate of the University may require a student to withdraw from the University at any time for unsatisfactory conduct, for failure to abide by regulations, for unsatisfactory progress, or for any other reason which is deemed to show that withdrawal is in the interests of the student, or the University, or both.

No course may be repeated more than once, except English 100, without special permission of the Dean; required First Year courses may also be exceptions.

Compassion and Welfare:

Applications for special consideration because of illness or domestic affliction must be submitted in writing to the Dean as soon as possible after the close of the examination period.

Students who are unavoidably absent because of illness or disability should, on return to classes, report to the Student Health Service, the Office of the Dean and to their instructors.

Students who because of illness are absent from a December or April examination must submit a certificate, obtained from a doctor, to the Student Health Service as promptly as possible.

Supplemental Examinations:

Supplementals are not a right but a **privilege** granted by the Dean after consideration of a student's complete academic standing. A student who has written final examinations but failed a course or courses in the Winter, Spring or Summer session, or correspondence course, may be granted permission to write supplementals in courses for which supplemental examinations are provided. In courses in the Faculty of Science supplemental examinations will usually be available only if regularly scheduled exminations (December and/or April) account for 40% or more of the final grade in the course.

Supplemental examinations for Winter Session are given in late July or early August. Students who fail a final examination in December, cannot take a supplemental examination prior to this period because this privilege, if granted, is based on the student's **complete** academic standing, which is determined after final examinations in April.

Eligibility:

(a) In the Winter session, normally the student must have:
  (i) passed the laboratory work, written the final examination and obtained at least 40% standing in the course in which the supplemental is granted, and
  (ii) obtained a 60% average in the number of units of course work required for satisfactory standing in the same academic session.

(b) In an extra-sessional (Winter, Spring, Summer) or correspondence course, general University regulations apply (see General Information section of this Calendar).

(c) In all but the final (graduating) year a candidate who has been granted a supplemental may write it only once. A student who fails a supplemental examination must repeat the course or take a permissible substitute. However, in the graduating year a supplemental examination may be written twice with permission of the Dean.

Credit:

If the supplemental examination is passed with a grade of at least 50%, credit will be given for the course. In the computation of the overall average in the work of a session or for a degree, the grade in a supplemental examination, if passed, will be considered as 50%. Similarly the overall average will not be changed if a subject already passed is written for a higher standing.

Graduation Standing:

In an *Honours Program* the categories of degree are Class I and Class II, calculated on the basis of a minimum of 21 units of courses, numbered 300 or above, designated as part of the program by the Department, and approved by the Dean.

In a *Major Program* the categories of degree are Class I, Class II and Pass, calculated on the basis of a minimum of 15 units of courses, numbered 300 or above, designated as part of the program by the Department, and approved by the Dean.

In the *General Science Program* the categories of degree are Class I, Class II and Pass, calculated on the required work of the Third and Fourth Years including a minimum of 15 units of courses numbered 300 or higher.

Combined B.Sc. and D.M.D. Degree Program

Students who have completed the Third Year in one of the approved degree programs of the Faculty of Science at U.B.C. *and* the first two years in the Faculty of Dentistry at U.B.C., and who have completed ALL the course requirements of the degree program may be eligible for the appropriate B.Sc. degree. It is necessary that such students meet all of the specific course requirements of the departmental degree program and have the approval of the Head of the Department **prior** to entry into the Faculty of Dentistry. Students should plan to meet these specific course requirements while in the Faculty of Science. With the approval of the Dean of Science up to 15 units of course work in the Faculty of Dentistry may be recognized for credit towards the B.Sc. degree.

Students in the Faculty of Dentistry who wish to qualify for the B.Sc. degree must file a copy of their program in first and second year Dentistry with the Dean of Science by September 15 of the Winter Session of the year preceding the Fall in which they plan to qualify for the B.Sc. degree.

Combined B.Sc. and M.D. Degree Program:

Students who have completed the Third year in an approved degree program of the Faculty of Science *and* the first year in the Faculty of Medicine at U.B.C., may be eligible for the appropriate B.Sc. degree. The B.Sc. Degree will be awarded in the fall following completion of First Year Medicine provided that these requirements are met:

1. Completion of all specific course requirements of the Science degree program and approval of the Department adviser **prior** to enrolling in First Year Medicine;
2. Completion of the Faculty of Science requirements with approval of the Office of the Dean;
3. Filing of a copy of the First Year Medicine Authorization to Register form at the Office of the Dean of Science on or before September 15 of that year, to formally declare intent of obtaining a B.Sc. degree. Department approval may be noted on this copy;
4. Successful completion of the First Year of Medicine;
5. Application at the Office of the Registrar for Fall graduation.

Veterinary Medicine

The Western College of Veterinary Medicine was established at the University of Saskatchewan to serve the four western provinces. The prerequisites for admission to the College are English (3), Physics (3), Mathematics (3), Chemistry (including organic) (6), Biology or Zoology (including genetics) (4½), plus electives to complete at least 2 full years of study.

These prerequisites can be met in a number of departments in the Faculty of Science. However, since genetics is offered only in third year, it will normally take longer than the minimum time to meet all requirements. Students intending to apply for entry to the College should register in one of the appropriate programs at UBC leading to a B.Sc. (Also see Faculty of Agricultural Sciences statement in this Calendar.)

Further information regarding entrance to Veterinary Medicine may be obtained from the Office of the Dean, Faculty of Science, UBC, or Faculty of Agricultural Sciences UBC; or directly from the University of Saskatchewan.

Faculty of Science Pairing List

Students may obtain credit for only **one** course in the following list of **introductory courses in statistics:**

Biology 300	Statistics 105
Geography 374	Psychology 316
Plant Science 321	Psychology 366

(See also Probability and Statistics listings. For page number, see Index).

Listed below are courses in which there is sufficient overlap that credit may be obtained for only one course in each group. However, it does not necessarily follow that the courses in each group are equivalent.

Chemistry

1. Chemistry 103, 110, 120, 150
2. Chemistry 201, 205, 208
3. Chemistry 202, 205, 208
4. Chemistry 201, 251
5. Chemistry 201, 252
6. Chemistry 203, 230, 260
7. Chemistry 250, 310, 335
8. Chemistry 251, 262, 304, 305
9. Chemistry 252, 304, 305
10. Chemistry 255, 304, 305
11. Chemistry 306, Geology 330
12. Chemistry 311, 352
13. Chemistry 313, 330

Computer Science

1. Computer Science 101, 111, 114, 151; Forestry 130
2. Computer Science 116, 118
3. Computer Science 210, 213, 215
4. Computer Science 302, 350, Electrical Engineering 258
5. Computer Science 405, Commerce 310
6. Computer Science 406, Commerce 410, 411
7. Computer Science 406, Mathematics 342
8. Computer Science 413, Electrical Engineering 476
9. Computer Science 414, Electrical Engineering 478
10. Computer Science 417, Electrical Engineering 456
11. Computer Science 435, Forestry 435

Geography

1. Geography 101, 330
2. Geography 202, 214, Soil Science 214
3. Geography 205, 313, Civil Engineering 478
4. Geography 213, 306, Geology 351
5. Geography 308, Soil Science 308

Geological Sciences

1. Geology 105, 125, 150
2. Geology 206, 216, 256
3. Geology 216, 226, 256
4. Geology 307, 308
5. Geology 304, 354
6. Geology 307, 308, 317
7. Geology 312, 322
8. Geology 330, Chemistry 306
9. Geology 358, 428
10. Geology 368, 418, Mining & Mineral Process Engineering 350
11. Geology 426, Oceanography 303, 404

Geophysics and Astronomy

1. Geophysics 221, Physics 213
2. Geophysics 310, Astronomy 310
3. Geophysics 315, Astronomy 315
4. Geophysics 320, Physics 406
5. Geophysics 400, 420
6. Geophysics 400, 421

Life Sciences

1. Biochemistry 300, Biology 201 plus Biochemistry 302, Biochemistry 303
2. Biology 101, 102, 310, 311, 313
3. Biology 101, 102, Forestry 300
4. Biology 200 and 201, 202
5. Biology 300, Plant Science 321
6. Biology 301, Forestry 430, Statistics 305, Plant Science 322
7. Biology 313, Microbiology 200, 417
8. Biology 311, 321 and 322, 323
9. Biology 334, 335
10. Biology 334, Agricultural Sciences 213, Animal Science 313, Forestry 302
11. Biology 422, Soil Science 311
12. Botany 209 plus 210, 211
13. Botany 311, Plant Science 258
14. Botany 330, Plant Science 324 and 325
15. Botany 415, Oceanography 415
16. Marine Science 446, Zoology 323, Psychology 306
17. Microbiology 200, 417, Biology 313
18. Oceanography 316, Zoology 316, Marine Science 435
19. Oceanography 406, Zoology 406
20. Oceanography 415, Botany 415
21. Pharmacology 300, 390
22. Physiology 301 and 302 (or 303), Zoology 303, Animal Science 320
23. Psychology 200, 260
24. Psychology 304, 360
25. Psychology 316, 366
26. Psychology 413, 463
27. Psychology 416, 466
28. Psychology 306, Marine Science 446, Zoology 323
29. Zoology 203 and 205, 206
30. Zoology 303, Animal Science 320, Physiology 301 and 302 or 303
31. Zoology 307 and 308, Physiology 400 (for 3 units)
32. Zoology 311, Plant Science 331
33. Zoology 316, Oceanography 316, Marine Science 435
34. Zoology 323, Marine Science 446, Psychology 306
35. Zoology 406, Oceanography 406
36. Zoology 413, Microbiology 426
37. Zoology 415, Marine Science 412
38. Anatomy 390, 400 (for 3 units)

Mathematics

1. Mathematics 100, 111, 120, 140, 153
2. Mathematics 101, 121, 154
3. Mathematics 200 and 201, 225
4. Mathematics 152, 221, 222
5. Mathematics 255, 315
6. Mathematics 200, 253
7. Mathematics 201, 254
8. Mathematics 205, 302, Statistics 205, 251, 302
9. Mathematics 221, 222
10. Mathematics 255, 315
11. Mathematics 256, 257, 316, Physics 312
12. Mathematics 300, 321
13. Mathematics 315 and 316, 323
14. Mathematics 342, Computer Science 406

Oceanography

1. Oceanography 300, 308
2. Oceanography 301, 407
3. Oceanography 302, 309, 316
4. Oceanography 303, 404, Geology 426
5. Oceanography 316, Zoology 316, Marine Science 435
6. Oceanography 401, 405
7. Oceanography 406, Zoology 406
8. Oceanography 415, Botany 415

Physics

1. Physics 110, 115, 120, 140, 150
2. Physics 115, 120, 252
3. Physics 150, 156, 203, 213, Geophysics 221
4. Physics 155, 170 and 175, 206, 216
5. Physics 200, 250
6. Physics 201, 251, 301, 311
7. Physics 209, 215
8. Physics 306, 456
9. Physics 308, 458
10. Physics 309, 319
11. Physics 312, Mathematics 256, 257, 316
12. Physics 303, 356
13. Physics 304, 355
14. Physics 351, 401, 411
15. Physics 355, 402
16. Physics 403, 455
17. Physics 406, Geophysics 320

Statistics

1. Statistics 205, 251, 302, Mathematics 205, 302

PROGRAMS OFFERED IN THE FACULTY OF SCIENCE

GENERAL SCIENCE PROGRAM

The General Science degree program requires that the student accomplish an introductory course in each of the five designated areas of the Faculty of Science. These areas (and the introductory courses) are:

1. Chemistry (Chemistry 110 or 120)
2. Earth Science (Geography 101, or Geology 105, or Geophysics 120 plus Geology 125)
3. Life Science (Biology 101 or 102)
4. Mathematics (Mathematics 100 and 101 or Mathematics 120 and 121)
5. Physics (Physics 110, 115 or 120)

Normally these introductory courses must be completed in the first two years at the university.

The student is also required to accomplish, in the required 15 units of Science courses numbered 300 or above, at least 9 units in one area, at least 3 units in a different area, and at least 3 units in an area different from the preceding two. One of these three areas must be Life Science (Biochemistry, Biology, Botany, Microbiology, Pharmacology, Physiology, Zoology). The other areas are to be selected from Chemistry, Earth Science (Astronomy, Geography, Geology, Geophysics), Mathematical and Computer Science (including Statistics) and Physics.

Students with exceptionally good records from their first two years in the Faculty of Science may instead, with special permission of the Dean, choose to complete nine (9) units of courses numbered 300 or higher in each of two (2) of the five areas of the Faculty listed above.

Courses selected must be acceptable for Major or Honours programs in the specific areas of concentration.

ASTRONOMY

The Department of Geophysics and Astronomy offers opportunities for study in Astronomy at the bachelor's, master's and doctoral levels. For information on the M.Sc. and Ph.D. degree programs, see the Graduate Studies section of the calendar.

Requirements for the B.Sc. degree in Astronomy:

Major

First Year		Second Year	
Chemistry 120 or 110	(3)	(Admissions requirement: 60% Standing in first year Physics course or permission of Department Head.)	
Mathematics 100, 101 (120, 121)	(3)		
Physics 120 or 115, or 110	(3)	Mathematics 200, 221, 315	(4½)
English 100	(3)	Physics 200, 203, 209	(4½)
Arts Elective[1]	(3)	Elective[2]	(3)
		Arts Elective	(3)
	(15)		(15)

Third Year		Fourth Year	
Astronomy 302, 303	(3)	Astronomy 401, 402	(3)
Physics 206, 301, 308	(4½)	Astronomy 421, 431	(3)
Mathematics 201	(1½)	Physics 303, 304, 307	(4)
Mathematics 316 or Physics 312	(1½)	Electives	(5)
Electives[3]	(4½)		
	(15)		(15)

[1]Students wishing to preserve entry into a Geophysics program should take Geophysics 120 plus Geology 125 and postpone the Arts electives until Third Year.
[2]Recommended: Astronomy 200 (3).
[3]Recommended: Computer Science 101 (1½), 114 and 116 (3), or 118 (1½).

Honours Astronomy and Geophysics — Focus Planetary Sciences

First Year		Second Year	
Chemistry 110 or 120	(3)	Chemistry 208	(3)
Mathematics 100, 101 (120, 121)	(3)	Computer Science 101 or 118	(1½)
Physics 120 or 115 or 110	(3)	Geology 200	(1½)
English 100	(3)	Mathematics 200, 221, 315	(4½)
Geophysics 120 and Geology 125[1]	(3)	Physics 200, 203, 209	(4½)
		Arts Elective	(3)
	(15)		(18)

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Third Year		Fourth Year	
Geophysics and Astronomy 315	(3)	Physics 304	(1½)
Geophysics 320	(1½)	Geophysics 424 or Physics 303	(1½)
Mathematics 201	(1½)	Geophysics 426	(1½)
Mathematics 316 or Physics 312	(1½)	Arts elective	(3)
Physics 303 or Geophysics 424	(1½)	*Option A*[2]	
Physics 206, 301	(3)	Astronomy 421, 431	(3)
Physics 307, 308[2] or Geophysics 321, 322[3]	(2½-3)	Astronomy 449	(1-3)
Arts elective	(3)	Science electives	(5-3)
		Option G[3]	
		Geophysics 420, 421	(3)
		Geophysics 449	(1-3)
		Science electives	(5-3)
	(17½-18)		(16½)

[1] Geology 105 may be accepted.
[2] Required courses in the Astronomy Option. Science elective to be chosen in consultation with the Departmental program adviser.
[3] Required courses in the Geophysics Option. Science elective to be chosen in consultation with the Departmental program adviser.

Combined Honours Astronomy and Physics

See Physics Programs

BIOCHEMISTRY

The Department offers opportunities for study leading to bachelor's, master's and doctoral degrees. For information on the M.Sc. and Ph.D. degree programs, see the Faculty of Graduate Studies section of the calendar.

There are two separate options leading to a B.Sc. degree within the Biochemistry program; one emphasizes the metabolic and structural aspects of Biochemistry (option A) and the other emphasizes the genetic and molecular biological aspects of Biochemistry (option B). Both Major options provide a strong background in Biochemistry and both are sufficiently flexible for students to develop their interests in allied fields (e.g., microbiology, food science, chemistry, etc.). Either Major option is appropriate for students who anticipate a professional career in the Health Sciences.

Either of the two Honours options is the recommended route for students interested in graduate studies in Biochemistry or related disciplines. However, students enrolled in a Major program with a strong academic record may also apply for graduate studies.

Requirements for the B.Sc. degree:

Option A: Metabolic and Structural Aspects

Major

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 205 or 201 and 202	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 203	(3)
Physics 110 or 115 or 120	(3)	Mathematics 200	(1½)
English 100	(3)	Microbiology 200	(3)
		Elective[1]	(1½)
	(15)		(15)

Third Year		Fourth Year	
Biochemistry 303	(3)	Biochemistry 402, 403	(3)
Biochemistry 301	(1½)	Physiology 301	(3)
Chemistry 305	(3)	Arts elective	(3)
Chemistry 313	(3)	Electives chosen in consultation with the Department[1]	(6)
Arts elective	(3)		
Elective chosen in consultation with the Department[1]	(1½)		
	(15)		(15)

Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 203	(3)
Mathematics 100, 101 (or 120, 121)	(3)	Chemistry 201, 202	(3)
Physics 110, 115 or 120	(3)	Mathematics 200	(1½)
English 100	(3)	Microbiology 200	(3)
		Arts elective	(3)
		Science elective[1]	(1½)
	(15)		(18)

Third Year		Fourth Year	
Biochemistry 303	(3)	Biochemistry 402, 403	(3)
Biochemistry 301	(1½)	Biochemistry 404	(1)
Chemistry 313	(3)	Biochemistry 420	(1½)
Chemistry 305	(3)	Biochemistry 421 or 449	(1½)
Biology 334	(1½)	Science electives[1]	(6)
Physiology 301	(3)	Two units from Chemistry 335, 405, 411; 413	(2)
Arts elective	(3)		
	(18)		(15)

Option B: Genetic and Molecular Biological Aspects

Major

First and Second Year
as in Option A

Third Year		Fourth Year	
Biochemistry 301	(1½)	Biochemistry 402	(1½)
Biochemistry 303	(3)	Biochemistry 403	(1½)
Chemistry 313 or 305	(3)	Biochemistry 410	(1½)
Biology 334	(1½)	Microbiology 408	(1½)
Microbiology 325	(1½)	Arts Elective	(3)
Arts Elective	(3)	Electives[1]	(6)
Science Elective[1]	(1½)		
	(15)		(15)

Honours

First and Second Year
as in Option A

Third Year		Fourth Year	
Biochemistry 301	(1½)	Biochemistry 402, 403	(3)
Biochemistry 303	(3)	Biochemistry 404	(1)
Chemistry 305	(3)	Biochemistry 410	(1½)
Chemistry 313	(3)	Biochemistry 420	(1½)
Biology 334	(1½)	Biochemistry 421	(1½)
Microbiology 325	(1½)	Microbiology 408	(1½)
Arts Elective	(3)	Science Electives[1]	(6½)
	(16½)		(16½)

[1]Suggested Science electives (Major and Honours):

Second, Third or Fourth Year

Biology 334	(1½)			Mathematics/Statistics 205	(1½)
Computer Science 114 and 116 or 118	(1½-3)			Zoology 203	(1½)
Third or Fourth Year					
Biochemistry 410[4]	(1½)	Chemistry 411	(1½)	Microbiology 409[3]	(1½)
Biochemistry 448	(1½)	Chemistry 413	(1)	Med Genetics 410[3]	(1½)
Biochemistry 449[2]	(1½/3)	Chemistry 435	(1)	Med Genetics 420[3]	(1½)
Biology 300	(1½)	Chemistry 305		Med Genetics 421[3]	(1½)
Biology 301	(1½)	or 313[2]	(3)	Physiology 301[2]	(3)
Biology 330	(3)	Microbiology 302	(1½)	Zoology 304	(1½)
Botany 435	(3)	Microbiology 324	(1½)	Zoology 405	(1½)
Botany 437[3]	(1½)	Microbiology 325[4]	(1½)	Zoology 407[3]	(3)
Chemistry 335	(3)	Microbiology 402	(1½)	Zoology 408	(1½)
Chemistry 405	(1)	Microbiology 408[4]	(1½)	Zoology 425[3]	(1½)

[2]Required courses for Option A; suggested electives for Option B.
[3]These electives are more relevant for Option B.
[4]Required courses for Option B; suggested electives for Option A.

Combined Biochemistry and Chemistry Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 203	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 205 (or 201 and 202)	(3)
Physics 110, 115 or 120	(3)	Mathematics 200	(1½)
English 100	(3)	Microbiology 200	(3)
		Arts Elective	(3)
	(15)		(16½)

Third Year		Fourth Year	
Biochemistry 303	(3)	Biochemistry 402, 403	(3)
Biochemistry 301	(1½)	Biochemistry 404	(1)
Chemistry 313	(3)	Chemistry 335 (or 310)	(3)
Chemistry 305 (or 304)	(3)	Chemistry Electives[2]	(4)
Chemistry 311	(2)	Physiology 301[3]	(3)
Arts Elective	(3)	Chemistry 449 or Biochemistry 420 and 449	(3)
Elective[1]	(2)		
	(17½)		(17)

[1]Recommended Science electives: Biology 300, 334; Mathematics 221; Microbiology 302, 325: note Mathematics 221 is prerequisite for Chemistry 312.
[2]To be chosen from Chemistry 312 and 400 level Chemistry lecture courses (Chemistry 405, 406, 411, 413, 435 recommended).
[3]Zoology 303 may be substituted.

BIOLOGY

Biology is not treated as a department but as a field of study. At the undergraduate level, programs are sponsored and instruction is offered cooperatively by the Departments of Botany, Microbiology, and Zoology. Inquiries should be directed to the Chairman, Biology Program, Biological Sciences Bldg. Rm. 2523, The University of British Columbia, Vancouver, B.C., V6T 1W5. Students wishing to undertake a graduate program in Biology at U.B.C. should consult the Life Science department or departments most appropriate to the field of specialization. For further information consult the Faculty of Graduate Studies section of this Calendar. In special cases inter-departmental programs can be arranged.

Note: Biology 101 or Biology 102 (or equivalent) is prerequisite to all Biology courses, except Biology 310, 311 and 313.

Primarily for First Year Students

Either Biology 101 or Biology 102 is the prerequisite for admission to Major or Honours programs in the Life Sciences Departments. Either course will suffice to meet the First Year Biology requirement of the Faculties, or Schools, of Agricultural Sciences, Dentistry, Forestry, Family and Nutritional Sciences, Medicine, Pharmaceutical Sciences, Physical Education and Recreation, and Rehabilitation Medicine. Since Biology 101 and Biology 102 are ultimately equivalent, credit may be obtained for only **one.**

Ecology: Students interested in a program in ecology may take a course of study in Botany, Zoology or Biology (General Biology, Option III—see below). Recommendations on the selection of courses can be obtained from ecology advisers in Botany, Zoology or the Biology program.

Requirements for the B.Sc. degree:

Major and Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 230 or 203	(3)
Mathematics 100, 101 (120, 121)	(3)	Electives	(9)
Physics 110, 115 or 120	(3)	Chosen from:	
English 100	(3)	Arts	(3)
		Botany 209[1]	(1½)
		Botany 210[1]	(1½)
		Chemistry 205 (201 and 202)	(3)
		Computer Science 101	(1½)
		Computer Science 114	(1½)
		Computer Science 116	(1½)
		Computer Science 118	(1½)
		Geography 101	(3)
		Geology 105[1,3]	(3)
		Mathematics 200	(1½)
		Mathematics 201	(1½)
		Mathematics/Statistics 205	(1½)
		Mathematics 220	(1½)
		Mathematics 221	(1½)
		Microbiology 200[1,2]	(3)
		Psychology 260	(3)
		Zoology 203[1]	(1½)
		Zoology 205[1,3]	(1½)
	(15)		(15)

[1]Courses recommended in the General Biology Option.
[2]Courses recommended in the Genetics Option.
[3]Courses recommended in the Marine Biology Option.

Options

Third and Fourth Year

At least eighteen units of courses from the lists of recommended courses below are required for a B.Sc. in Biology. Following are listed recommended combinations of courses in a number of generally recognized divisions of biology. Further information may be obtained from the Biology Program Office, Biological Sciences Bldg. Room 2523.

In the Honours Biology program (all options), **at least 18 units of concurrent course work must be taken in Third Year.** Between Third and Fourth Years, a maximum of 6 units of course work may be taken in Spring/Summer Session.

The B.Sc. program must include at least nine (9) units of Arts courses (including English 100) to qualify for graduation.

I. Cell Biology:

Major: Biology 300 (1½), 330 (3), 334 (1½); Electives selected from Group I (12); Electives (12).

Honours: Biology 300 (1½), 330 (3), 334 (1½), 449 (3); Electives selected from Group I (6); Electives selected in consultation with Biology Chairman (Cell Biology Advisers) (12); Electives (9).

II. Genetics:

Major: Biology 300 (1½), 330 (3), 334 (1½); Biochemistry 302 (1½); Electives selected from Group II (10½); Electives (12).

Honours: Biology 300 (1½), 330 (3), 334 (1½), 449 (3); Biochemistry 302 (1½); Electives selected in consultation with Biology Chairman (Genetics Advisers) (16½); Electives (9).

III. General Biology:

Major: Biology 300 (1½), 321 (1½), 322 (1½), 334 (1½); Electives selected from Group III[1] (12); Electives (12).

Honours: Biology 300 (1½), 321 (1½), 322 (1½), 334 (1½), 449 (3); Electives selected from Group III[1] (6); Electives selected in consultation with Biology Chairman (General Biology Advisers) (12); Electives (9).

[1] In the General Biology Option, no more than nine (9) units of 300/400 level courses may be taken as electives in any one of the Life Sciences Departments.

IV. Marine Biology:

Major: Biology 300 (1½), 334 (1½); Botany 301 (1½), Botany 330 or Zoology 303 (3). Electives selected from Group IV-A (4½); Electives selected from Groups IV-A and IV-B (6); Electives (12).

Honours: Biology 300 (1½), 334 (1½), 449 (3); Botany 301 (1½); Botany 330 (3) or Zoology 303 (3); Electives selected from Group IV-A (7½). Electives selected in consultation with Biology Chairman (Marine Biology Advisers[2]) (6); Electives (12).

Each student on the Honours Program (Marine Biology Option) will be required to complete at least 1½ units of course work in Marine Biology at a marine station.[3] This course will comprise part of the total of 18 units required in the Fourth Year, and should be taken in Intersession or Summer Session in the period between Third and Fourth Years. Certain courses are available at the Bamfield Marine Station; these vary from year to year, but are selected from Marine Science courses. Honours students should consult with the Marine Biology Advisers concerning this requirement and with the appropriate marine station for up-to-date information on courses to be offered and fees.

[2] Students may also directly consult the Heads of Departments of Botany and Zoology concerning the selection of electives in Marine Biology.
[3] If marine station selected is other than the Bamfield Marine Station, prior approval must be obtained from Registrar for transfer credit.

Recommended Electives
Third and Fourth Years

Group I. Cell Biology

Biology 301 (1½), 302 (1½), 315 (3), 340 (1½), 422 (1½), 436 (1½), 448 (1-3); Biochemistry 300 (3), 301 (1½), 302 (1½), 303 (3), 402 (1½), 403 (1½), 410 (1½); Botany 308 (1½), 330 (3), 409 (1½), 435 (3), 437 (1½); Chemistry 201 (1½), 202 (1½), 205 (3), 304 (3), 305 (3), 310 or 335 (3), 311 (2), 313 or 330 (3), 405 (1), 406 (1), 411 (1½), 413 (1), 435 (1); Microbiology 302 (1½), 324 (1½), 325 (1½), 402 (1½), 405 (3), 408 (1½), 409 (1½); Physics 231/239 (3); Physiology 301 (3); Zoology 303 (3), 304 (1½), 306 (1½), 307 (1½), 325 (1½), 407 (3), 408 (1½), 411 (1½), 417 (1½), 420 (1½), 425 (1½), 427 (1½), 428 (1½), 429 (1½), 431 (1½), Anatomy 405 (1½).

Group II. Genetics

Biochemistry 403 (1½); 410 (1½); Biology 340 (1½), 434 (1½), 436 (1½), 448 (1-3); Botany 437 (1½); Medical Genetics 410 (1½), 419 (1½), 420 (1½), 421 (1½), 430 (3); Microbiology 302 (1½); 324 (1½), 325 (1½), 402 (1½); 408 (1½); 409 (1½); Zoology 325 (1½), 402 (1½), 407 (3), 417 (1½), 425 (1½).

Group III. General Biology

Biology 301 (1½), 302 (1½), 315 (3), 405 (1½), 422 (1½), 436 (1½), 448 (1-3); Biochemistry 301 (1½), 302 (1½), 303 (3); Botany 301 (1½), 306 (1½), 307 (1½), 308 (1½), 310 (1½), 311 (1½), 312 (3), 330 (3), 409 (1½), 410 (1½), 411 (1½), 412 (1½), 413 (1½), 414 (1½), 415 (1½), 416 (1½), 426 (1½), 427 (1½), 435 (3), 441 (1½), 442 (1½); Geography 301 (1½), 401 (1½); Geology 308 (1½), 310 (3), 321 (1½), 421 (1½); Microbiology 324 (1½), 325 (1½), 405 (3); Oceanography 316 (1½), 415 (1½); Soil Science 414 (1½); Zoology 303 (3), 304 (1½), 305 (1½), 306 (1½), 307 (1½), 311 (1½), 316 (1½), 323 (1½), 325 (1½), 400 (3), 402 (1½), 403 (3), 404 (1½), 406 (1½), 408 (1½), 410 (3), 411 (1½), 412 (1½), 413 (3), 416 (1½), 421 (3), 428 (1½), 429 (1½), 430 (1½), 431 (1½)

Group IV. Marine Biology

A. Biology 301 (1½), 302 (1½), 315 (3), 321 (1½), 322 (1½), 405 (1½); Botany 410 (1½); Geology 308 (1½); Oceanography 316 (1½); Zoology 304 (1½), 305 (1½), 306 (1½), 316 (1½), 323 (1½).

B. Biology 422 (1½), 448 (1-3); Biochemistry 301 (1½), 302 (1½); Botany 308 (1½), 330 (3), 409 (1½), 411 (1½), 412 (1½), 415 (1½), 426 (1½), 427 (1½); Geography 301 (1½), 401 (1½); Geology 321 (1½), 421 (1½); Oceanography 308 (1½), 309 (1½), 401 (1½), 405 (1½), 406 (1½), 415 (1½); Zoology 303 (3), 307 (1½), 402 (1½), 403 (3), 404 (1½), 406 (1½), 408 (1½), 412 (1½), 413 (3), 414 (3), 415 (3), 428 (1½), 429 (1½), 430 (1½); Marine Science[4] 400 (3), 401 (3), 402 (1½), 410 (3), 411 (3), 412 (3), 413 (3), 420 (3), 430 (3), 435 (3), 440 (3),445 (3), 446 (3).

[4]Certain courses in Marine Science are offered by the Western Canadian Universities Marine Biological Society's Laboratory (at Bamfield on Vancouver Island) during Spring Session and Summer Session. Up to 6 units of credit courses may be taken at the Bamfield Marine Station in the Summer period preceding registration for the Fourth Year.

Combined Biology and Chemistry Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 205 (201 and 202)	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 203	(3)
Physics 110, 115 or 120	(3)	Mathematics 200	(1½)
English 100	(3)	Microbiology 200	(3)
		Arts elective	(3)
	(15)		(16½)

Third Year		Fourth Year	
Biology 334	(1½)	Biochemistry 303	(3)
Biology 330	(3)	Chemistry 335 (or 310)	(3)
Chemistry 305 (or 304)	(3)	Chemistry 311	(2)
Chemistry 313	(3)	Chemistry Electives[2]	(4)
Biology Elective[1]	(3)	Biology Electives[3]	(3)
Arts elective	(3)	Biology or Chemistry 449	(3)
	(16½)		(18)

[1]Organismal: Three units from: Biology 315; Botany 209/210, 311; Zoology 203/205.
[2]To be chosen from 400-level Chemistry lecture courses.
[3]Biology, Botany or Zoology course pertaining to organisms suggested.

Combined Biology and Oceanography Honours
See Oceanography Honours

Graduate Program

The field of Biology is not treated by a single department. Students wishing to pursue a graduate program in Biology should consult the department or departments most appropriate to the field of specialization. Graduate study in Biology is designed to accommodate those students with a diverse biological background. For further information consult the Faculty of Graduate Studies section of this Calendar.

Marine Science

Certain marine science courses are offered at the Western Canadian Universities' Marine Biological Station (WCUMBS) on Vancouver Island (Bamfield) during the Spring and Summer Sessions. Details may be obtained by writing the WCUMBS Representative, c/o Dean of Science, 1507 - 6270 University Boulevard, The University of British Columbia, Vancouver, B.C. V6T 1W5. Marine Science courses listed in the "Courses of Instruction" section of the calendar are designed for Life Science students at the Third-and Fourth-Year level.

BOTANY

Honours and Major programs are available in Botany. In selecting electives it is suggested that students should not take Botany courses to the exclusion of other related subjects. Botany Department advisers should be consulted before the beginning of each year.

The Department offers opportunities for study leading to doctoral, master's and bachelor's degrees. For information on the Ph.D. and M.Sc. degree programs, see the Faculty of Graduate Studies section of the calendar.

Certain courses in Marine Science (see end of Biology section) are offered at the Western Canadian Universities Marine Biological Society's Laboratory at Bamfield, Vancouver Island; a maximum of 6 units of these courses may be taken for credit in Spring Session/Summer Session preceding registration in Fourth Year.

Students interested in a program in ecology can take a course of study in Botany, Zoology or Biology (General Biology, Option III). Recommendations on the selection of courses can be obtained from ecology advisers in Botany, Zoology or the Biology program.

Biology 101 or 102 (or equivalent) is prerequisite to all courses in Botany, except Botany 310.

Requirements for the B.Sc. degree:

Major

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Physics 110, 115 or 120	(3)	Botany 209, 210	(3)
Chemistry 110 or 120	(3)	Chemistry 230	(3)
Mathematics 100, 101 (120, 121)	(3)	Arts elective	(3)
English 100	(3)	Elective	(3)
	(15)		(15)

Third Year and Fourth Year

Botany 330	(3)
Biology 300 or Plant Science 321 or Statistics 105	(1½)
Biology 321	(1½)
Biology 334	(1½)
Botany Electives	(6)
Science Electives	(4½)
Arts Elective	(3)
Electives	(9)
	(30)

Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Physics 110, 115 or 120	(3)	Botany 209, 210	(3)
Chemistry 110 or 120	(3)	Chemistry 230	(3)
Mathematics 100, 101 (120, 121)	(3)	Arts elective[1]	(3)
English 100	(3)	Elective[2]	(3)
	(15)		(15)

Third Year and Fourth Year

Botany 301 and 311	(3)
Botany 330	(3)
Botany 449	(3)
Biology 300, Plant Science 321 or Statistics 105	(1½)
Biology 321	(1½)
Biology 334	(1½)
3 units from Botany 306, 307 or 308	(3)
Botany Electives	(9)
Science Electives[2]	(7½)
Arts elective[1]	(3)
	(36)

[1]Students planning to proceed to graduate work are advised to elect at least one course in a foreign language.
[2]Those planning on teaching careers in Secondary School are advised to take courses in Zoology as their electives.

In the Botany Honours program, at **least 18 units of concurrent course work must be taken in Third Year**. Between Third and Fourth Years, a maximum of 6 units of course work may be taken in Spring Session/Summer Session.

Combined Botany and Oceanography Honours
See Oceanography Honours

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CHEMISTRY

The Department offers opportunities for study leading to bachelor's, master's and doctoral degrees. For information regarding facilities for graduate study see the Faculty of Graduate Studies section of the calendar.

It is assumed that all students entering courses of the Department have passed Chemistry 11 or the equivalent; those who have not must consult the Department before registering. All students who intend to take Honours or to major in Chemistry must consult the Head of the Department before registration each year.

Requirements for the B.Sc. degree:

Major

First Year		Second Year	
Chemistry 110 or 120	(3)	Chemistry 201, 202	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 203	(3)
Physics 110, 115 or 120	(3)	Mathematics 200	(1½)
English 100	(3)	Science elective[1]	(3)
Elective	(3)	Electives[1,2]	(4½)
	(15)		(15)

Third and Fourth Years

Chemistry 310 or 335[3]	(3)
Chemistry 311[3]	(2)
Chemistry 415	(1)
Mathematics 221[1]	(1½)
Any two of a, b or c below:	
(a) Chemistry 304 or 305	(3)
(b) Chemistry 312[1]	(2)
(c) Chemistry 313 or 330	(3)
Chemistry Electives[4]	(3-4)
Arts Elective[2]	(3)
Electives[2]	(10½)
	(30)

[1]Mathematics 221 prerequisite for Chemistry 312: students planning to take Chemistry 312 in third year must take Mathematics 221 in second year.
[2]Electives must include at least 6 units of Arts. At least 6 units of electives must be in courses numbered 300 or above.
[3]Must be taken in third year.
[4]Major students who have satisfactory academic standing may enrol in Chemistry 449 with permission of Head of the Department.

Honours

First Year		Second Year	
Chemistry 110 or 120	(3)	Chemistry 201, 202	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 203	(3)
Physics 110, 115 or 120	(3)	Mathematics 200, 221	(3)
English 100	(3)	Arts Elective[2]	(3)
Elective	(3)	Electives[1]	(6)
	(15)		(18)

Third Year		Fourth Year	
Chemistry 304	(3)	Chemistry 401	(1½)
Chemistry 310 or 335	(3)	Chemistry 415	(2)
Chemistry 311	(2)	Chemistry 449	(3)
Chemistry 312	(2)	Chemistry electives[3]	(4½)
Chemistry 313 or 330	(3)	Electives[2]	(6)
Electives[2]	(3)		
	(16)		(17)

[1]Three units of Physics or another Science strongly recommended.
[2]Electives must include at least 6 units of Arts.
[3]Chosen from Chemistry 302, 306 and 400-level courses

Note: Reading knowledge of French, German or Russian is highly desirable. Students who have taken French in Secondary School should take German or Russian.

Combined Biochemistry and Chemistry Honours
See Biochemistry Programs

Combined Biology and Chemistry Honours
See Biology Programs

Combined Chemistry and Mathematics Honours

First Year		Second Year	
Chemistry 110 or 120	(3)	Chemistry 201, 202	(3)
Mathematics 120, 121 (100, 101)	(3)	Chemistry 203	(3)
Physics 110, 115 or 120	(3)	Mathematics 222	(3)
English 100	(3)	Mathematics 225, (200, 201)	(3)
Elective[1]	(3)	Physics 206	(1½)
		Science elective	(1½)
	(15)	Arts elective	(3)
			(18)

Third Year		Fourth Year	
Chemistry 304	(3)	Chemistry 311	(2)
Chemistry 310	(3)	Chemistry 401	(1½)
Chemistry 312	(2)	Chemistry 415	(1)
Mathematics 320	(3)	Chemistry electives	(2½)
Two of Mathematics 321 or 300 Mathematics 322 Mathematics 323	(6)	Approved Mathematics electives chosen from Mathematics 400, 418, 420, 422-426	(6)[1]
		Arts elective	(3)
	(17)		(16)

[1]Computer Science 114/116 is highly recommended.

Combined Chemistry and Oceanography Honours
See Oceanography Programs

Combined Chemistry and Physics Honours
See Physics Programs

COURSES:

Primarily for First-Year Students

Chemistry 103 is not intended for students in Faculty of Science programs or those planning to enter the Faculty of Applied Science.

Chemistry 110 or Chemistry 120 is the normal prerequisite for admission to science programs and to the Faculty of Applied Science. The difference between the two lies in the background of the student: those students with credit for Chemistry 11 only take Chemistry 110, whereas those with credit for Chemistry 12 take Chemistry 120. Both require Mathematics 100 and 101 and a first year Physics course as corequisites.

Primarily for Second-Year Students

Students who have not taken a first year Chemistry course at the University of British Columbia are assumed to have read *"General Chemistry, Principles and Structure"*, Brady, J. E. and Humiston, G. R., 3rd Ed., John Wiley and Sons, 1982. Major students planning to take Chemistry 312 in third year must take Mathematics 221 in second year.

Primarily for Third-Year Students

Honours and Major students are required to take Chemistry 311 and either 310 or 335 in third year.

Primarily for Fourth-Year Students

Honours students are required to take 2 units of the integrated laboratory course Chemistry 415. Major students are required to take at least 1 unit of Chemistry 415, specifically in the areas of analytical and inorganic chemistry, and may elect to take an additional ½ or 1 unit of Chemistry 415.

COMPUTER SCIENCE

The Department offers opportunites for study leading to bachelor's, master's and doctoral degrees. For information on the M.Sc. and Ph.D. degree programs, see the Faculty of Graduate Studies. All students who intend to take Honours in Computer Science must consult the Head of the Department.

Requirements for the B.Sc. degree:

Major and Honours

First Year	
Computer Science 114, 116[1]	(3)
Mathematics 100, 101 (120, 121)	(3)
Physics 110, 115 or 120	(3)
Chemistry 110 or 120	(3)
English 100	(3)
	(15)

[1]Computer Science 118 (1½) and a 1½ unit elective can be substituted by those

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eligible for Computer Science 118. Strong students are encouraged to take Computer Science 210. Special arrangements may be made for a student who did not take Computer Science 114 and 116 or 118 in First Year; however, such arrangements may limit choice of 400-level courses.

Students wanting to take any Computer Science course numbered above 200 should obtain and complete a Preapproval Application Form from the Department of Computer Science. In addition to the prerequisites listed, enrolment will be controlled by imposing stringent academic admissions criteria. Students should consult the Computer Science Department during the spring or summer to determine the criteria for admission to these courses.

Major

Second Year		Third and Fourth Years	
Computer Science 210, 213 (or 215)	(3)	Computer Science 310	(3)
Computer Science 220	(1½)	Other Computer Science courses numbered 300 or above[2]	(6)
Mathematics/Statistics 205, Mathematics 221	(3)	Further Computer Science courses numbered 400 or above[2]	(6)
Mathematics Elective	(1½)	Mathematics courses numbered 300 or above[3]	(6)
Arts elective	(3)	Arts elective	(3)
Elective	(3)	Electives[4]	(6)
	(15)		(30)

[2]For Major students, it is recommended that at least two of the optional Computer Science Courses be chosen from application areas (e.g., Computer Science 302, 402, 403, 404, 405, 406).

[3]Mathematics courses in analysis, applied mathematics, linear algebra, probability and differential equations and Statistics are recommended. Such courses include Mathematics 300, 302, 303, 307, 315, 316, 340, 341, 342, 345, 400, 407, and 426 and Statistics 304, 305, 306, 405 and 406.

[4]Appropriate courses from other fields of possible computer applications are suggested. In particular, attention is called to the following courses outside the Faculties of Arts and Science, for which credit will be granted: Commerce 356, 410, 411, 456, 457, 458; Electrical Engineering 256, 358, 364.

Honours

Second Year		Third and Fourth Years	
Computer Science 210, 213 (or 215)	(3)	Computer Science 302, 310 321	(7½)
Computer Science 220	(1½)	Computer Science 420	(1½)
Mathematics/Statistics 205, Mathematics 200, 220, 221	(6)	Other Computer Science courses numbered 300 or above[2]	(10½)
Arts elective	(3)	Mathematics courses numbered 300 or above[3]	(9)
Elective	(3)	Arts elective	(3)
		Elective[4]	(3)
	(16½)		(34½)

[2]Computer Science 448 is recommended.

[3]Mathematics courses in analysis, applied mathematics, linear algebra, probability, and differential equations and Statistics courses are recommended.

[4]Courses in logic, foundations of mathematics, and Electrical Engineering 256 are strongly recommended.

Major in Mathematical Computing
(offered with Department of Mathematics)

Second Year		Third and Fourth Years	
Computer Science 210, 213 (or 215), 220	(4½)	Computer Science 302, 310, 405	(7½)
Mathematics/Statistics 205, Mathematics 200, 221, 315	(6)	Mathematics 307, 340, 341, Statistics 305	(6)
Arts elective	(3)	Courses chosen from:	
Elective[1]	(1½)	Computer Science 402, 403, 406	
		Mathematics 302, 303, 316, 342, 345, 407	
		Statistics 304, 306, 405	(6)
		Arts elective	(3)
		Electives[2]	(7½)
	(15)		(30)

[1]Students should consider the advisability of taking Mathematics 220.

[2]Students are encouraged to take courses in areas of application in consultation with a program adviser.

Combined Honours in Computer Science and Mathematics

First Year		Second Year	
English 100	(3)	Computer Science 210, 213 (or 215),	(3)
Mathematics 120, 121 (100, 101)	(3)	Computer Science 220	(1½)
Chemistry 110 or 120	(3)	Mathematics 200, 220, 221, 315	(6)
Physics 110, 115 or 120	(3)	Arts elective	(3)
Computer Science 114 and 116[1]	(3)	Elective	(3)
	(15)		(16½)
Third Year		**Fourth Year**	
Computer Science 302[2], 310, 321	(7½)	Computer Science 420	(1½)
Computer Science course numbered 300 or above	(1½)	Computer Science courses numbered 300 and above	(3)
Mathematics 300, 320	(6)	Two courses from Mathematics 400, 418, 420, 421, 422, 423, 424, 425, 426 or Statistics 406	(6)
One of Mathematics 322 or 316 and 345	(3)	Arts elective	(3)
		Elective	(3)
	(18)		(16½)

[1]Computer Science 118 and a 1½-unit elective may be substituted by those eligible for Computer Science 118. Strong students are encouraged to take Computer Science 210. Special arrangements may be made for a student who did not take Computer Science 114 and 116 or 118 in First Year. Such arrangements may limit choice of 400-level courses.

[2]May be deferred to the following year.

Combined Honours in Computer Sciences and Physics

First Year		Second Year	
As for Honours Physics, but in lieu of the "Arts Elective" Computer Science 114 and 116 (3), or Computer Science 118 (1½) (for those eligible) and 1½ unit elective.[1]		Physics 200, 206	(3)
		Physics 203, 209	(3)
		Mathematics 200, 221, 315	(4½)
		Computer Science 210, 213 (or 215)	(3)
		Elective[2,3]	(3)
			(16½)
Third Year		**Fourth Year[4]**	
Physics 301, 304	(3)	Physics 307	(1)
Physics 303, 306	(3)	Physics 308, 402	(3)
Physics 309	(2)	Physics 449	(3)
Computer Science 302	(3)	Computer Science 402 or 403	(1½)
Computer Science 220	(1½)	Additional Computer Science (per consultation)	(6)
Computer Science 310	(3)	Arts Elective	(3)
Mathematics 316	(1½)		
	(17)		(17½)

[1]Excellent students are encouraged to take Computer Science 210 in First Year.

[2]It is recommended that Mathematics 201 be taken in the second term of the second year.

[3]A total of 9 units of Arts (including English 100) is required.

[4]To be implemented 1987/88. For 1986/87 consult 85/86 calendar.

CO-OPERATIVE EDUCATION PROGRAM: COMPUTER SCIENCE

Co-operative Education is a process of education which integrates academic study with related and supervised work experience in co-operating employer organizations.

An optional year-round Co-operative Education Program is available for students in Computer Science. The Program is intended to help prepare interested and qualified students for careers in the computing industry with a minimum of 17.5 months of work placement supervised by practising professionals. Faculty advisers also visit students at their place of work and provide advice on technical reports required of all students in the program.

To be eligible, students must be admitted to the second year of the Computer Science B.Sc. program. Selection of students will be based on academic performance and general suitability to the work environment as determined by resume and interview. The total enrolment will be subject to the availability of appropriate work placements and faculty advisers. The work placements are arranged by mutual agreement between students and employing organizations. Participating students register for CPSC 298, 299, 398, 399, or 499 as appropriate, and pay the Co-operative Education Program fee for each course (see Index for Fees — Special Fees). Graduation in the Co-operative Education Program requires a student to complete each of CPSC 298, 299, 398, 399 and 499, in addition to the normal

academic requirements. Students who complete less than five courses will have each satisfactorily completed course noted on their academic record.

Detailed information on the program can be obtained from the Department of Computer Science or from the Office of Co-operative Education in room 213 Brock Hall, The University of British Columbia, 1874 East Mall, Vancouver, B.C., V6T 1W5.

GEOGRAPHY

The Department offers opportunities for study leading to bachelor's, master's and doctoral degrees. For information on the Ph.D., M.A. and M.Sc. degree programs, see the Faculty of Graduate Studies. For information on the B.A. degree program, see the Faculty of Arts.

Requirements for the B.Sc. degree:

Students entering the Major, Honours or Combined Honours program should consult the science adviser of the Department of Geography.

Students registered in the B.Sc. Geography program must take at least 3 units of Arts courses outside the Department of Geography in addition to English 100.

Major in Physical Geography

First Year		Second Year	
English 100	(3)	Geography 202 and 205	(3)
Mathematics 100, 101 (120, 121)	(3)	Geography 220 or 260	(1½)
Physics 110, 115 or 120	(3)	Statistics 105, Mathematics 200	(3)
Chemistry 110 or 120	(3)	Computer Science 101	(1½)
Geography 101[1]	(3)	Geophysics 221 or Chemistry 208	(3)
		Arts elective	(3)
	(15)		(15)
Third Year		**Fourth Year**	
Geography 301 or 302	(1½)	Six units from: Geography 308, 401, 402, 405, 406, 409, Geology 342, 442	(6)
Geography 306,[3] 310	(3)	Electives	(9)
Geography 370 or 372	(1½)		
3 Units from Geography 315, 317, 415, 417, 418	(3)		
Geography 309[2]	(1½)		
Soil Science 200 or Geology 256 or Biology 321	(1½)		
Statistics 205	(1½)		
Arts elective	(1½)		
	(15)		(15)

[1]Special arrangements may be made for students unable to take this course in first year.
[2]Field Course taken in May of the Third Year.
[3]Student who took the former 213 in second year should take 313 instead.

Honours — Climatology/Meteorology[1]

First Year		Second Year	
English 100	(3)	Geography 202, 205	(3)
Mathematics 100, 101 (120, 121)	(3)	Mathematics 200, 221	(3)
Physics 110, 115 or 120	(3)	Geophysics 221	(3)
Chemistry 110 or 120	(3)	Statistics 105, 205	(3)
Geography 101[2]	(3)	Computer Science 101	(1½)
		Elective[3]	(1½)
	(15)		(15)
Third Year		**Fourth Year**	
Geography 301, 302 and one of 401, 402[4] or 403	(4.5)	Geography 409 and two of 401, 402[4] or 403	(4½)
Geography 309[5]	(1½)	Geography 449	(1½)
Mathematics 315 and Physics 312	(3)	Oceanography 308 and 401	(3)
Mathematics 201 or Physics 329	(1½)	Physics 421 or 314 or Chem. Eng. 251	(1-2)
Chemistry 302[6]	(1½)	Geology 342 or Soil Science 414	(1½)
Elective[3]	(6)	Electives[3]	(6½-5½)
	(18)		(18)

[1]Entry into the program requires a 70 percent average mark in the previous full year.
[2]Special arrangements can be made for students who have been unable to take this course in first year.
[3]Electives must include 6 units Arts credit. Students considering a career in Meteorology should consult the department regarding choice of electives.
[4]Given in alternate years.
[5]Field Course taken in May of the Third Year.
[6]Chemistry 201 is recommended before this course.

Combined Honours Geography and Geology — Focus Geomorphology

First Year		Second Year	
English 100	(3)	Geography 202, 205	(3)
Mathematics 100, 101 (120, 121)	(3)	Geography 220 or 260	(1½)
Physics 110, 115 or 120	(3)	Geology 206 and 226	(3)
Chemistry 110 or 120	(3)	Mathematics 200, 221	(3)
Geography 101[1] or Geology 105[1]	(3)	Geophysics 221 or 200-level Chemistry	(3)
		Computer Science 101	(1½)
		Elective[2]	(1½-3)
	(15)		(16½-18)
Third Year		**Fourth Year**	
Geography 308, 306	(3)	Geography 405[3] or 406[3]	(1½)
Geography 405[3] or 406[3]	(1½)	Geology 415 or 425	(1½)
Geology 200, 309, 342	(4½)	Geology 442	(1½)
Geography 310, 374	(3)	Geography 449 or Geology 449	(3)
Geography 370 or Geology 305	(1½)		
Geography 309[4] or Geology 335[4]	(-)	Geography 309[4] or Geology 335[4]	(1½)
Mathematics 315	(1½)	Electives[2]	(3-1½)
Physics 312 (or Geology 315)	(1½)	Earth Sciences Electives[5]	(4½)
Elective[2]	(1½)		
	(18)		(16½-15)

[1]Special arrangements can be made for students who have been unable to take this course in first year.
[2]Electives must include 4½ units Arts credit.
[3]Given in alternate years.
[4]Field Course students must register in 3rd Year; course credited in 4th Year. Note: Geology 335 requires Geology 235 as a prerequisite.
[5]From approved courses numbered 300 and above in Applied Science, Astronomy, Forestry, Geography, Geological Sciences, Geophysics, Oceanography, Soil Science.

GEOLOGICAL SCIENCES

The Department offers opportunities for study leading to doctoral, master's and bachelor's degrees. For information on the Ph.D. and M.Sc. degree programs, see the Faculty of Graduate Studies.

A non-laboratory general course, Geology 310, is offered for students who wish to have a general background in Geological Sciences as it relates to development of resources and conservation of the environment in Canada. (Not for credit in Earth Science Departments.)

Geology 105 or 125 (or 150) is normally prerequisite for all other courses in geology except for Geology 310. Students who have not taken one of these courses but who wish to take subsequent geology courses must consult the department for special arrangements before registering.

Graduation as a geologist is possible through Honours or Major programs in the Faculty of Science, or through Geological Engineering in the Faculty of Applied Science. Further information on the B.A.Sc. program is in the Applied Science section of this Calendar.

Intending Honours or Major students must obtain formal program approval from the Departmental Adviser before registering for their Second, Third and Fourth Years. General Science Program students are encouraged to obtain formal program approval from the Geological Sciences Adviser for all Geology courses.

Students taking courses in Geological Sciences may be required to participate in field trips.

Students intending to enrol in graduate studies in Geological Sciences are encouraged to take an Honours program. In addition to the requirements listed in the introduction to the Faculty of Science section of this Calendar, Honours students must meet the following requirements in order to be admitted to or remain in the Honours program:

1) Entrance to the Honours Program will not be permitted after admission to the Third Year.
2) Honours students must successfully pass at least 15 units in each year while enrolled in the program, with at least a 65% average. At least 18 units must be passed in Third Year.
3) In order to enter or remain in the Honours Program, a student must maintain a cumulative average mark of at least 72%.
4) An honours thesis is required and must be submitted to the Department office on or before the last day of classes during the student's graduation year.

Requirements for the B.Sc. degree:

Major

First Year		Second Year	
Geology 105	(3)	Geology 206, 226	(3)
Chemistry 120 or 110	(3)	Geology 200, 201	(3)
Physics 120, 115 or 110	(3)	Geology 235	(0)
Mathematics 100, 101 (120, 121)	(3)	Statistics 105	(1½)
English 100	(3)	Mathematics 200 or 221 or Computer Science 101 or 114	(1½)
		Chemistry 208	(3)
		Biology 101 or 102 or Geophysics 221	(3)
	(15)		(15)

Third Year		Fourth Year	
Geology 302, 303, 309	(4½)	Geology 415 or 425	(1½)
Geology 304	(3)	Earth Science Electives[2]	(4½)
Geology 305, 321	(3)	Electives	(6)
Geology 335[1]	(1½)	Arts Elective	(3)
Arts Elective	(3)		
	(15)		(15)

[1]Field School in May after Third Year.
[2]Courses numbered 300 or over in Geological Sciences, Astronomy, Geophysics, Geography, Oceanography, Soil Science, or other pertinent Science or Applied Science.

Honours

First Year		Second Year	
Geology 105	(3)	Geology 200, 201	(3)
Chemistry 120 or 110	(3)	Geology 206, 226	(3)
Physics 120, 115 or 110	(3)	Geology 235	(0)
Mathematics 100, 101 (120, 121)	(3)	Statistics 105	(1½)
English 100	(3)	Two of Mathematics 200, 221 or Computer Science 101 or 114	(3)
		Chemistry 208	(3)
		Biology 101 or 102 or Geophysics 221	(3)
	(15)		(16½)

Third Year		Fourth Year	
Geology 302, 303, 309	(4½)	Geology 415 or 425	(1½)
Geology 304	(3)	Additional Geology courses numbered 300 or above	(6)
Geology 305, 321	(3)	Geology 449	(3)
Geology 323	(1½)	Arts Elective	(3)
Geology 335[1]	(1½)	Elective	(3)
Arts Elective	(3)		
Elective[2]	(1½)		
	(18)		(16½)

[1]Field School in May after Third Year.
[2]Recommended courses in Geology are 315, 330, 333, 342, 351.

Combined Honours Geology and Geography — Focus Geomorphology
See Geography Programs

Combined Honours Geology and Geophysics

First Year		Second Year	
Geology 125 and Geophysics 120[1]	(3)	Geology 200, 201 and 256	(4½)
Chemistry 110 or 120	(3)	Mathematics 200, 201, 221	(4½)
Physics 110, 115 or 120	(3)	Physics 213, 215	(4)
Mathematics 100, 101 (120, 121)	(3)	Computer Science 101 or 114	(1½)
English 100	(3)	Arts Elective	(3)
	(15)		(17½)

Third Year		Fourth Year	
Geology 302, 304, 305	(6)	Geology 415 or 425	(1½)
Geophysics 320, 321 and 322	(4½)	Geophysics 420, 421	(3)
Mathematics 315, 316	(3)	Geology 449 or Geophysics 449	(3)
Physics 311, 319	(3)	Electives[2]	(6½)
		Arts Elective	(3)
	(16½)		(17)

[1]Geology 105 (3) may be substituted; special arrangements may be made for students unable to complete this requirement in First Year.
[2]Electives must include at least 1½ units selected from Geophysics 422, 423, 424, 425, 426. Note that some elective courses are only given in alternate years.

Combined Geology and Oceanography Honours
See Oceanography Programs

Combined Honours Geology and Another Subject

First Year		Second Year	
Mathematics 100, 101 (120, 121)	(3)	Mathematics (200 level)	(3)
Chemistry 120 or 110	(3)	Geology 200, 201, 206 and 226	(6)
Physics 120, 115 or 110	(3)	Geology 235	(0)
Geology 105[1]	(3)	Additional units in consultation with other department	(6)
English 100	(3)		
	(15)		(15)

Third Year		Fourth Year	
Geology units numbered 300 and above	(6)	Geology 449 or other department 449	(3)
Additional units in other department	(6)	Geology 335	(1½)
Additional units in consultation with other department	(3)	Geology courses numbered 300 and above	(4½)
Arts Elective	(3)	Additional units in other department	(6)
		Arts Elective	(3)
	(18)		(18)

[1]Geology 105 may be waived in certain circumstances.
Note: Timetabling and other problems may not permit programs in Geology and certain other departments.

Students planning careers in Geological Sciences should consult the Departmental Adviser for elective courses appropriate to their interests.

GEOPHYSICS

The Department offers opportunities for study leading to bachelor's, master's and doctoral degrees. For information on the M.Sc., M.A.Sc. and Ph.D. degree programs, see the Faculty of Graduate Studies. Astronomy courses offered by the Department are listed under Astronomy. All students who intend to take Honours in Geophysics or Astronomy must consult the Head of the Department.

Requirements for the B.Sc. degree in Geophysics:

Major

First Year		Second Year	
Geophysics 120 and Geology 125[1]	(3)	Computer Science 101	(1½)
Chemistry 120 or 110	(3)	Mathematics 200, 221, 315	(4½)
Mathematics 100, 101 (120, 121)	(3)	Physics 213, 215	(4)
Physics 120 or 115 or 110	(3)	Arts elective	(3)
English 100	(3)	Elective	(2)
	(15)		(15)

Third Year		Fourth Year	
Geology 308	(1½)	Geophysics 420, 421, 426	(4½)
Geophysics 320, 321, 322	(4½)	Geology 256, 354	(3)
Mathematics 201	(1½)	Geology Elective (numbered 300 and above)	(1½)
Physics 311, 312, 319	(4½)	Arts elective	(3)
Elective[2]	(3)	Elective[2]	(3)
	(15)		(15)

[1]Geology 105 may be substituted. Special arrangements may be made for students unable to complete this requirement in First Year.
[2]Electives must include at least 4 units from upper level Geophysics, Physics, Mathematics or Astronomy courses. Note that some elective courses are given only in alternate years.

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Honours

First Year		Second Year	
Geophysics 120 and Geology 125[1]	(3)	Computer Science 101	(1½)
Chemistry 120 or 110	(3)	Geology 200, 201	(3)
Mathematics 100, 101 (120, 121)	(3)	Mathematics 200, 220, 221, 315	(6)
Physics 120, 115 or 110	(3)	Physics 203, 209	(3)
English 100	(3)	Arts elective	(3)
	(15)		(16½)
Third Year		**Fourth Year**	
Geology 256	(1½)	Geophysics 420, 421	(3)
Mathematics 201	(1½)	Geophysics 426	(1½)
Mathematics 316 or Physics 312	(1½)	Geophysics 449	(3)
Geophysics 320, 321, 322	(4½)	Geology 304	(3)
Physics 301, 309	(3½)	Geology Elective (numbered 300 and above)	(1½)
Electives[2]	(4½)	Arts elective	(3)
		Elective[2]	(2)
	(17)		(17)

[1]Geology 105 may be substituted. Special arrangements may be made for students unable to complete this requirement in First Year.
[2]Include at least 4½ units from upper level Geophysics, Physics, Mathematics or Astronomy courses. Note that some elective courses are given only in alternate years.

Honours Astronomy and Geophysics — Focus Planetary Sciences
See Astronomy Programs

Combined Honours Geology and Geophysics
See Geological Sciences programs

Combined Honours Geophysics and Oceanography
See Oceanography programs

Combined Honours Geophysics and Another Subject

First Year		Second Year	
Mathematics 100, 101 (120, 121)	(3)	Computer Science 101	(1½)
Physics 120 or 115 or 110	(3)	Mathematics 200, 220, 221, 315	(6)
Chemistry 120 or 110	(3)	Physics 203, 209	(3)
English 100	(3)	Arts elective	(3)
Elective[1]	(3)	Electives[1]	(4)
	(15)		(17½)
Third Year		**Fourth Year**	
Mathematics 316, 300	(4½)	Mathematics 400	(3)
Physics 301	(1½)	Electives[1]	(14)
Physics 309	(2)		
Arts Elective	(3)		
Electives[1]	(6)		
	(17)		(17)

[1]Electives must be approved by the Honours advisors of the two departments concerned. They must be chosen to satisfy the general regulations of the Faculty of Science and must include at least 4½ units of Geological Sciences and 7½ units of Geophysics.

MATHEMATICS

The Department offers opportunities for study leading to doctoral, master's and bachelor's degrees. For information on the B.A. degree programs, see the Faculty of Arts. For information on the Ph.D., M.A., and M.Sc. degree programs, see the Faculty of Graduate Studies.

All Mathematics students should consult an adviser in the Mathematics Department each year.

The student should note that the first digit in the number of a course is intended to convey the level of mathematical maturity at which the course is conducted rather than the year in which it must be taken.

A student will be denied entry into a third year course if the minimal passing grade is obtained in a prerequisite second year course.

Requirements for the B.Sc. degree:

Major programs

The department offers a wide choice of options each of which is intended to introduce the student to some particular area of mathematical activity or application. The student should consult a Mathematics Major Advisor at the beginning of a second year or when considering the possibility of becoming a Mathematics Major. All Mathematics major programs have to be approved by the Department each year.

Honours programs

Students planning to take an Honours degree in Mathematics, Applied Mathematics, or Mathematics combined with another subject, please note the following:

1. Students are required to formulate a program of study at the beginning of second year (to be updated each year) under the guidance of a Mathematics Honours Advisor. The program must be approved by the Mathematics Honours Committee.
2. Language requirements: B.C. Grade 12 level French or German, or one year of University level French, German or Russian. For students who plan graduate work in Mathematics, further work in one of French, German or Russian is recommended.
3. To be admitted into an Honours Mathematics program, a student must obtain at least a second-class mark in Math 121 or a first-class mark in Math 101 and a first-class average in Math 100/101. To remain in Honours Mathematics, a student must obtain at least a second-class mark in each required Mathematics course and maintain an overall second-class average.
4. The following Mathematics courses are intended primarily for Honours students in any field who want a serious understanding of the material covered in the course: Mathematics 120, 121, 220, 222, 225, 300, 320-323, 400, 418, 420, 422-426.

Major

First Year		Second Year	
Mathematics 100, 101 (120, 121)[1]	(3)	Mathematics 200, 201 (225)	(3)
Physics 120, 115 or 110	(3)	Mathematics 220[3]	(1½)
Chemistry 120 or 110	(3)	Mathematics 221[4], 315	(3)
English 100	(3)	Arts Elective	(3)
Computer Science 114, 116 (118)[2]	(1½-3)	Elective[5]	(1½)
Elective	(0-½)		
	(15)		(15)

Third and Fourth Years

Mathematics and Math related courses as specified by one of the available options	(15)
Courses numbered 300 or above as specified by the option chosen	(6)
Arts Elective	(3)
Electives	(6)
	(30)

[1]Mathematically able students, if they qualify, should consider taking the stream Math 120, 121, 225, 222 in the first two years, since they may find the greater emphasis on concepts more suitable.
[2]Computer Science may be delayed until the second year.
[3]One of Math 220, 315 may be delayed until the third year.
[4]Math 222 may be taken instead of the combination 221/307.
[5]Some of the options require third year Computer Science or Statistics courses that have second year prerequisites. Students in the Mathematical Statistics option should take Math/Stat 302 in second year.

OPTIONS AVAILABLE (for Third and Fourth Years):

General Option: (Recommended for prospective teachers): Math/Stat 302, Math 307, 310, 311 or 322, 340. 4.5 additional units of approved Math, Statistics, or Computer Science courses numbered 300 or above. 6 additional approved units outside Math numbered 300 or above. With the approval of the Department, students may substitute courses chosen from Math 300, 320-323, 400, 418, 420-426 for some of the required Mathematics courses.

Applied Analysis Option: Math 307, 314 or 320, 300, 316 or 323, 345, Math/Stat 302, Computer Science 302. Statistics 305, Physics 206. 6 approved units numbered 300 or above in an area of application outside Mathematics, Statistics, and Computer Science.

Mathematical Computability Option: Math/Stat 302, Math 303, 307, 314 or 320, 322, 340, 342, 413. 3 units chosen from Computer Science 311, 312, 313, 321, 322, 420, 422. (Note that all these have Computer Science 210 and/or 213 and/or 220 as prerequisites.) 3 additional units of approved electives numbered 300 or above.

Mathematical Statistics Option: Math 307, 314 of 320, 302/303 (or 418). 3 additional units of Math numbered 300 or above. Statistics 305, 306, 404, 406. 6 units numbered 300 or above outside Math/Statistics, including at least one of Computer Science 302, 315, 404, 405.

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Numerical Analysis Option: Math 307, 314 or 320, 316, 340, 345, 407. Computer Science 302, 402, 403. Statistics 305 and an additional 4½ units of approved electives numbered 300 or above.

Optimization Option: Math 307, 314 or 320, 302/303 or 418, 340. 3 units chosen from Math 341, 342, 426. Computer Science 405 and 406. Statistics 305. 6 units of approved courses numbered 300 or above in an area of application outside Mathematics, Statistics, or Computer Science.

Mathematics Honours

First Year		Second Year	
Mathematics 120, 121 (100, 101)	(3)	Mathematics 222	(3)
Physics 120 (115 or 110)	(3)	Mathematics 225 (200, 201)	(3)
Chemistry 120 (110)	(3)	Mathematics 220[2]	(1½)
English 100	(3)	Physics 206	(1½)
Elective[1]	(3)	Computer Science 114, 116 (118)	(1½-3)
		Arts elective	(3)
		Electives[3]	(3-4½)
	(15)		(18)

Third and Fourth Years

Math 320, 321 or 300, 322, 323	(12)
At least 9 units chosen from Math 400, 418, 420, 422-426.	(9)
At least 6 units of approved Science course numbered 300 or above. Physics 301, 304. CpSc 302, Stat 406 are strongly recommended	(6)
Arts Elective	(3)
Electives	(3)
	(33)

[1] It may be convenient to take Computer Science 114/116 at this stage.

[2] Exemption from Math 220 may be granted to students who obtain a first class mark in Math 121, a first class average in Math 120/121, and at least a second class mark in the first term in Math 222 and 225.

[3] The courses in Science at level 300 or above required by the program will have usually second year prerequisites.

Honours — Applied Mathematics Option

First Year	Second Year	
Same as Honours Mathematics[4]	Same as Honours Mathematics except:	
	Electives[5]	(1½-3)
		(16½)

Third Year		Fourth Year	
Mathematics 300, 320, 323	(9)	Mathematics courses in area of concentration	(6-7½)
Mathematics courses in area of concentration[6]	(1½-4½)	Restricted Electives	(4½-6)
Courses in area of application[7]	(0-4½)	Courses in are of application	(1½-6)
Electives	(0-3)	Electives[5]	(0-3)
Arts Elective	(3)		
	(16½-18)		(18-16½)

The appropriate concentration courses and restricted fourth year electives are as follows:

	3rd Year	4th Year	Restricted Electives
Applied Analysis	CPSC 302 PHYS 306	MATH 400, 426	3 units from MATH 307, 407, CPSC 402, 403 3 units from STAT 305[8]/306, 406, MATH/STAT 302, MATH 303, 418.
Numerical Analysis	MATH 307 CPSC 302	MATH 400, 407, CPSC 406 and either CPSC 402 or 403	1.5 units from MATH 345 or PHYS 306 3 units from STAT 305[8]/306, 406, MATH/STAT 302, MATH 303, 418.
Operations Research	MATH 340 MATH 341	MATH 426 CPSC 405, 406	3 units from MATH/STAT 302, MATH 303, 418, STAT 406 3 units from MATH 307, 407, 420.
Statistics	STAT 305[8]	STAT 406 MATH 418	6 units from STAT 306, 404, 405, MATH 303, 400, 420, 426.

Special choices of concentration courses and electives may be arranged subject to the approval of the Head of the Department of Mathematics.

[4] It is useful to take CPSC 114/116 at this stage.

[5] The electives need to be chosen with care, since the required courses in the area of application will have second year prerequisites.

[6] The area of concentration may be Applied Analysis, Numerical Analysis, Operations Research, or Statistics.

[7] The area of application can be Economics, a field of Science, or a branch of Engineering. It may not be Mathematics, Computer Science, or Statistics. A total of 6 units of courses numbered 300 or above must be taken in one area of application.

[8] MATH/STAT 205 or MATH/STAT 302 is a prerequisite for STAT 305. Student planning to take several Statistics courses should consider taking MATH/STAT 302 in the second year.

Combined Honours in Mathematics with another subject

First Year	Second Year
Same as Mathematics Honours	Same as Mathematics Honours

Third and Fourth Years

MATH 320	(3)
Two of MATH 321 or 300, MATH 322, MATH 323	(6)
At least 6 units chosen from MATH 400, 418, 420, 422-426	(6)
Arts Elective	(3)
Electives[1]	(15)
	(33)

[1] Courses as specified by the other Department, but not to exceed 15 units in 3rd and 4th year.

Major in Mathematical Computing

See Computer Science Programs.

MICROBIOLOGY

The Department offers opportunities for study leading to doctoral, master's and bachelor's degrees. For information on the Ph.D. and M.Sc. degree programs, see the Faculty of Graduate Studies. All students who intend to take Honours in Microbiology must consult the Head of the Department.

Requirements for the B.Sc. Degree:

Major

First Year		Second Year	
English 100	(3)	Biology 200, 201	(3)
Biology 101 or 102	(3)	Chemistry 230 or 203	(3)
Mathematics 100, 101 (120, 121)	(3)	Microbiology 200	(3)
Physics 110, 115 or 120	(3)	Science elective	(3)
Chemistry 110 or 120	(3)	Arts elective	(3)
	(15)		(15)

Third Year		Fourth Year	
Biochemistry 302	(1½)	7½ units from Microbiology 307, 308, 402 403, 408, 409, 411, 418 430, 448, Biology 422	(7½)
Microbiology 302	(1½)		
Microbiology 321	(3)		
Microbiology 324, 325	(3)		
Biology 334	(1½)	Electives[1]	(7½)
Arts elective	(3)		
Elective[1]	(1½)		
	(15)		(15)

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Honours

First Year		Second Year	
English 100	(3)	Biology 200, 201	(3)
Biology 101 or 102	(3)	Chemistry 230 or 203	(3)
Mathematics 100, 101 (120, 121)	(3)	Microbiology 200	(3)
Physics 110, 115 or 120	(3)	Science elective	(3)
Chemistry 110 or 120	(3)	Arts elective	(3)
	(15)		(15)
Third Year		**Fourth Year**	
Biochemistry 302	(1½)	Microbiology 430	(3)
Microbiology 302	(1½)	Microbiology 449	(3)
Microbiology 321	(3)	4½ units from:	(4½)
Microbiology 324, 325	(3)	Microbiology 307, 308, 402 403, 408, 409, 411, 418	
Biology 334	(1½)	Biology 422	
Electives[1]	(4½)	Electives[1]	(7½)
Arts elective	(3)		
	(18)		(18)

[1]Recommended Science electives:

Biology 300	(1½)	Biochemistry 301	(1½)	Computer Science 101	(1½)
Biology 301	(1½)	Biochemistry 402	(1½)	Computer Science 114, 116	(3)
Biology 315	(3)	Biochemistry 403	(1½)		
Biology 330	(3)	Chemistry 205	(3)	Mathematics 200	(1½)
Biology 340	(1½)	Chemistry 301	(1½)	Medical Genetics 410	(1½)
Biology 422	(1½)	Chemistry 305	(3)	Microbiology 307	(1½)
Botany 301	(1½)	Chemistry 313	(3)	Microbiology 308	(1½)
Botany 308	(1½)	Chemistry 335	(3)	Zoology 413	(3)
				Zoology 420	(1½)

OCEANOGRAPHY

Combined Honours Oceanography and Another Science

The Department offers opportunities for study leading to doctoral, master's and combined Honours bachelor's degrees. For information on the Ph.D. and M.Sc. degree programs, see the Faculty of Graduate Studies.

A non-laboratory general course, Oceanography 310 "Man and the Oceans", is offered to Second, Third and Fourth year students who are not in Science, Applied Science and some Education programs.

Students intending to register for an undergraduate Oceanography degree must undertake a Combined Honours program with another science; a Major degree in Oceanography is not granted. Students intending Combined Honours must obtain formal program approval from both Departmental Advisers before registering in Second, Third and Fourth Years.

Honours candidates are expected to complete at least 15 units with a minimum overall second class standing (65%) in each academic year.

Requirements for the B.Sc. degree:

Combined Oceanography and Biology Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 230 or 203	(3)
English 100	(3)	Science electives[1,2]	(9)
Mathematics 100, 101 (120, 121)	(3)	Arts elective	(3)
Physics 110 or 115 or 120	(3)		
	(15)		(18)
Third and Fourth Years			
Oceanography 308, 316	(3)	Other Biology, Botany or Zoology courses numbered 300 or higher	(4½)
Oceanography 406, 408	(3)	Arts elective	(3)
Oceanography 449	(3)	Science electives[2]	(10½)
Biology 300, 334	(3)		
Biology 321, 322	(3)		(33)

[1] One of Geology 105, Geophysics 120 and Geology 125, Computer Science 114 and 116 (or 101 and 118), or Geography 101, and 6 additional units chosen from list given under Biology program, Second Year, including 3 units of courses on organisms, e.g. Botany 209 (1½) and Zoology 205 (1½) or Microbiology 200 (3).
[2] Mathematics 200 is strongly recommended in Second or Third Year; Science electives may include additional Oceanography courses in Third and Fourth Years.

Combined Oceanography and Botany Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Botany 209, 210	(3)
English 100	(3)	Chemistry 230 or 203	(3)
Mathematics 100, 101 (120, 121)	(3)	Zoology 205	(1½)
Physics 110 or 115 or 120	(3)	Science electives[1,2]	(4½)
		Arts elective	(3)
	(15)		(18)
Third and Fourth Years			
Oceanography 308, 316	(3)	Botany 410, 415 (Oceanography 415)	(3)
Oceanography 406, 408	(3)	Other Botany courses numbered 300 or higher	(4½)
Oceanography 449	(3)	Science electives[2,3]	(4½)
Biology 300	(1½)	Arts elective	(3)
Biology 321, 322	(3)		
Botany 301	(1½)		(33)
Botany 330	(3)		

[1] One of Geology 105, Geophysics 120 and Geology 125, Computer Science 114 and 116 (or 101 and 118), or Geography 101, and additional units for required total.
[2] Mathematics 200 is strongly recommended in Second or Third years; Science electives may include additional Oceanography courses in Third or Fourth Years.
[3] Biology 334 strongly recommended.

Combined Oceanography and Chemistry Honours

First Year		Second Year	
Chemistry 110 or 120	(3)	Chemistry 201, 202 (or 205)	(3)
English 100	(3)	Chemistry 203	(3)
Mathematics 100, 101 (120, 121)	(3)	Mathematics 200, 221	(3)
Physics 110 or 115 or 120	(3)	Science electives[1]	(6)
Elective	(3)	Arts elective	(3)
	(15)		(18)
Third Year		**Fourth Year**	
Chemistry 301	(1½)	Chemistry 310 (or 335)	(3)
Chemistry 304 (or 305)	(3)	Chemistry 421	(1)
Chemistry 311	(2)	Chemistry elective	(1½)
Chemistry 330 (or 313)	(3)	Oceanography 401, 407, 408	(4½)
Oceanography 308, 309	(3)	Oceanography 449 or Chemistry 449	(3)
Science electives[2]	(4½)	Arts elective	(3)
	(17)		(16)

[1] Must include one of: Geology 105 (or Geophysics 120 and Geology 125), Biology 101 or 102, Computer Science 114 and 116 (or 101 and 118), Geography 101.
[2] Science electives may include additional Oceanography courses in Third Year.

Combined Oceanography and Geology Honours

First Year		Second Year	
Geophysics 120 and Geology 125	(3)	Geology 200, 201	(3)
Chemistry 110 or 120	(3)	Geology 206, 226	(3)
English 100	(3)	Statistics 105	(1½)
Mathematics 100, 101 (120, 121)	(3)	Two of Mathematics 200, 221, Computer Science 101 or 114	(3)
Physics 110 or 115 or 120	(3)	Chemistry 208	(3)
		Electives[1]	(4½)
	(15)		(18)
Third Year		**Fourth Year**	
Oceanography 308, 309	(3)	Oceanography 401 or 405	(1½)
Geology 302, 309	(3)	Oceanography 407, 408, 416	(4½)
Geology 304	(3)	Geology 426	(1½)
Geology 321	(1½)	Oceanography 449 or Geology 449	(3)
Geology elective[2]	(1½)	Geology elective[2]	(1½)
Arts elective	(3)	Science elective[3]	(3)
	(15)	Arts elective	(3)
			(18)

[1] Recommended Biology 101 or 102 or Geophysics 221.

[2] Recommended courses include Geology 303, 323, 342, 405, 406, 416, 421 and 431.

[3] Science electives may include additional Oceanography courses in Fourth Year.

Combined Oceanography and Geophysics Honours

First Year		Second Year	
Geophysics 120 and Geology 125	(3)	Computer Science 101	(1½)
Chemistry 110 or 120	(3)	Geology 200, 256	(3)
English 100	(3)	Mathematics 200, 220	(3)
Mathematics 100, 101 (120, 121)	(3)	Mathematics 221, 315	(3)
Physics 110 or 115 or 120	(3)	Physics 203, 209	(3)
		Arts elective	(3)
	(15)		(16½)

Third Year		Fourth Year	
Oceanography 308, 309	(3)	Oceanography 401, 408	(3)
Physics 303, 309	(3)	Oceanography 449 or Geophysics 449[1]	(3)
Mathematics 201	(1½)	Geophysics 420, 421, 426	(4½)
Mathematics 316 (or Physics 312)	(1½)	Electives[2]	(5)
Geophysics 320, 321, 322	(4½)		
Arts elective	(3)		
	(16½)		(15½)

[1] Electing Geophysics 449 requires that 3 units of electives be Oceanography courses.

[2] To be chosen in consultation with the departments.

Combined Oceanography and Physics Honours

First Year		Second Year	
Chemistry 110 or 120	(3)	Physics 200, 203	(3)
English 100	(3)	Physics 206, 209	(3)
Mathematics 100, 101 (120, 121)	(3)	Mathematics 200, 221, 315	(4½)
Physics 120 or 115 or 110	(3)	Science elective[2]	(3)
Elective	(3)	Arts elective	(3)
	(15)		(16½)

Third Year		Fourth Year	
Physics 301, 308	(3)	Physics 401, 402	(3)
Physics 303, 304	(3)	Physics 406, 408	(2)
Physics 306	(1½)	Oceanography 408	(1½)
Physics 307, 309	(3)	Oceanography 409	(1)
Mathematics 201[3], 316	(3)	Oceanography 449 or Physics 449	(3)
Oceanography 308, 309, 401	(4½)	Arts elective	(3)
		Science elective[4]	(3)
	(18)		(16½)

[1] One of Geology 105 (or Geophysics 120 and Geology 125), Biology 101 or 102, Computer Science 114 and 116 (or 101 and 118), Geography 101.

[2] Recommended: more Computer Science, Mathematics, or Geography 212.

[3] Students are encouraged to take Mathematics 201 in the second year.

[4] Recommended from the following: Mathematics 300, Mathematics 345, Geography 301, Geography 302, Geophysics 322, Computer Science 302.

Combined Oceanography and Zoology Honours

First Year		Second Year	
Chemistry 110 or 120	(3)	Biology 200, 201	(3)
English 100	(3)	Zoology 203, 205	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 230	(3)
Physics 110 or 115 or 120	(3)	Science electives[1,2]	(6)
Biology 101 or 102	(3)	Arts elective	(3)
	(15)		(18)

Third and Fourth Years

Oceanography 308, 316	(3)	Zoology 304	(1½)
Oceanography 406, 408	(3)	Biology 321, 322	(3)
Oceanography 449	(3)	Zoology 402	(1½)
Biology 300	(1½)	Science electives[2,3]	(10½)
Zoology 303	(3)	Arts elective	(3)
			(33)

[1] One of Geology 105, Geophysics 120 and Geology 125, Computer Science 114 and 116 (or 101 and 118) or Geography 101, and additional units for required total.

[2] Mathematics 200 is strongly recommended in Second or Third years; Science electives may include additional Oceanography courses in Third or Fourth Years.

[3] Zoology 340 and 440 available as electives; Biology 334 and Zoology 415 strongly recommended.

PHARMACOLOGY

The Department of Pharmacology and Therapeutics offers opportunities for study leading to doctoral, master's and bachelor's degrees (Honours and Major). For information on the Ph.D. and M.Sc. degree programs, see the Faculty of Graduate Studies section of the calendar. For further information on other courses within the Department, consult the Faculty of Medicine section of the calendar. All students who intend to take Honours in Pharmacology must consult the Head of the Department.

Requirements for the B.Sc. degree:

Major

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 201, 202 (or 205)	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 203 (or 230)	(3)
Physics 110 or 115 or 120	(3)	Microbiology 200	(3)
English 100	(3)	Arts elective	(3)
	(15)		(15)

Third Year		Fourth Year	
Biochemistry 301	(1½)	Biochemistry 402 and 403	(3)
Biochemistry 302 or 303	(1½-3)	Pharmacology 400[2]	(3)
Pharmacology 300	(3)	Science electives	(9)
Physiology 301	(3)		
Arts elective	(3)		
Science elective[1]	(3-1½)		
	(15)		(15)

[1] Suggested electives: Biology 300, 302; Computer Science 101, 114.

[2] In consultation with the Department; suggested electives: Biology 300, 302; Chemistry 305, 313; Microbiology 302; Zoology 307, 308.

Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 201, 202 (or 205)	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 203 (or 230)	(3)
Physics 110 or 115 or 120	(3)	Microbiology 200	(3)
English 100	(3)	Arts elective	(3)
		Science elective[3]	(3)
	(15)		(18)

Third Year		Fourth Year	
Biochemistry 301	(1½)	Biochemistry 403	(1½)
Biochemistry 303	(3)	Pharmacology 400	(3)
Pharmacology 300	(3)	Pharmacology 402	(3)
Biology 300	(1½)	Pharmacology 404	(1½)
Physiology 301	(3)	Physiology 422, 423 or 424	(1½)
Physiology 303	(1½)	Science electives[4]	(6)
Arts elective	(3)		
	(16½)		(16½)

[3] Suggested electives: Computer Science 101 (1½), 114 (1½), 116 (1½), Mathematics 200.

[4] In consultation with the Department; suggested electives: Pharmaceutical Sciences 335, 448; Biochemistry 402; Physiology 422, 423, 424; Biology 302; Chemistry 305, 313; Microbiology 302; Psychology 463.

PHYSICS

The Department offers opportunities for study leading to bachelor's, master's and doctoral degrees. For information on the M.Sc., M.A.Sc. and Ph.D. degree programs and courses, see the Faculty of Graduate Studies.

Before registering for each of the Second, Third and Fourth years, every student who intends to commence or continue either the Physics Major, or any Honours Program in Physics must obtain formal Program Approval from a Physics Departmental Adviser. This may be sought as soon as the student has received the "Authorization to Register" form and the previous year's Statement of Marks (which should be presented). Students in the General Science Program are invited to consult a Departmental Adviser concerning appropriate courses.

Physics 110 prerequisite is B.C. Secondary School Physics 11 or equivalent, or special permission.
Physics 115 prerequisite is B.C. Secondary School Physics 12.
Physics 120 prerequisites are excellent performance in B.C. Secondary School Physics 12, Mathematics 12 **and** approval by a Physics Departmental Adviser.

Co-operative Education Program: Physics

Co-operative Education is a process of education which integrates academic study with related and supervised work experience in co-operating employer organizations.

An optional Co-operative Education Program is available for students in Honours Physics. The Program is intended to help prepare interested and qualified students for research careers in industry with twenty months of work placement supervised by practising professionals. Faculty advisers also visit students at their place of work and provide advice on technical reports required of all students in the program.

To be eligible, students must be admitted to the second year of the Honours Physics B.Sc. program. Selection of students will be based on academic performance and general suitability to the work environment as determined by resume and interview. The total enrolment will be subject to the availability of appropriate work placements and faculty advisers. The work placements are arranged by mutual agreement between students and employing organizations. Participating students register for Physics 298, 299, 399, 498 or 499 as appropriate, and pay the Co-operative Education Program fee per course (see Index for Fees — Special Fees).

Graduation in the Co-operative Education Program requires a student to complete each of Physics 298, 299, 399, 498 and 499, in addition to the normal academic requirements. Students who complete less than five courses will have each satisfactorily completed course noted on their academic record.

Detailed information on the program can be obtained from the Department of Physics or from the Office of Co-operative Education in Room 213, Brock Hall, The University of British Columbia, 1874 East Mall, Vancouver, B.C. V6T 1W5.

Requirements for B.Sc. degree:

Major

First Year		Second Year	
Physics 120, 115 or 110	(3)	(Admission requirement: 60% standing in first year Physics course.)	
Mathematics 100, 101 (120, 121)	(3)		
Chemistry 120 or 110	(3)		
English 100	(3)	Physics 213, 215, 216	(6)
Elective	(3)	Mathematics 200, 221, 315	(4½)
		Arts elective	(3)
		Elective[1]	(1½)
	(15)		(15)

Third Year[2]		Fourth Year[2]	
Mathematics 201	(1½)	Physics 412	(1½)
Physics 200	(1½)	Physics 308	(1½)
Physics 312	(1½)	Physics 307	(1)
Physics 311, 319	(3)		
Physics Elective[3,4]	(5½)		
Arts Elective	(3)		
Electives[3]	(10)		
Total	(30)		

[1] At least one basic course in Computer Science (101, 114 or 118) is strongly recommended.
[2] Early consultation with a Physics Departmental Adviser is recommended before entering Third and Fourth Year.
[3] To be chosen from Physics 305, 314, 326, 405, 406, 407, 409, 411, 414, 421.
[3] Exceptional Physics Major students may be admitted in their final year to one or more of Physics 303, 304, 306, 400 upon receiving special approval from the appropriate course instructor(s).

Honours

First Year		Second Year	
Physics 120, 115 or 110	(3)	(Admission Requirements: A clear pass from First Year with an overall Second Class standing, or at least Second Class standing in each First Year Physics, Chemistry and Mathematics course.)	
Mathematics 120, 121 (100, 101)	(3)		
Chemistry 120 or 110	(3)		
English 100	(3)		
Arts elective	(3)	Physics 200, 206	(3)
		Physics 203, 209	(3)
		Mathematics 200, 201[1]	(3)
		Mathematics 221, 315	(3)
		Arts Elective	(3)
		Science Elective[1,2]	(3)
Total Units	(15)		(18)

[1] Mathematics 201 or 1½ units of Science Elective may be postponed to Third Year.
[2] At least one course in Computer Science is recommended.

An average standing of at least 65% must be obtained in each year to remain in the Honours Program (Single or Combined).

Third Year		Fourth Year[5]	
Physics 301, 308	(3)	Physics 401, 402	(3)
Physics 303, 304	(3)	Physics 409	(1½)
Physics 306	(1½)	Physics 449	(3)
Physics 307, 309	(3)	Additional Physics[3]	(3)
Mathematics 300, 316	(4½)	Mathematics 400[4]	(3)
Elective	(1½)	Elective	(3)
	(16½)		(16½)

[3] Chosen from the following Physics courses: 400, 403, 406, 408, 453, 454, or 477.
[4] With the permission of the Head of the Physics Department another course may replace Mathematics 400.
[5] To be implemented 1987/88. For 1987/87 students take Physics 403 (1½) in place of Physics 449 and take 3 units of Physics 409.

Combined Physics and Astronomy Honours

First Year		Second Year	
As for Honours Physics	(15)	As for Honours Physics Recommended Science Elective Astronomy 200	(18)

Third Year		Fourth Year[3]	
Physics 301, 308	(3)	Physics 401, 402, 403	(4½)
Physics 303, 304, 306	(4½)	Astronomy 401, 402, 421, 431	(6)
Physics 307, 309	(3)	Astronomy 449[1]	(3)
Astronomy 302, 303	(3)	Electives[2]	(3)
Mathematics 300	(3)		
	(16½)		(16½)

[1] Physics 449 may be substituted with the permission of the Heads of the Astronomy and Physics Departments.
[2] Mathematics 400 is strongly recommended.
[3] To be implemented 1987/88. For 1986/87 consult 85/86 calendar.

Combined Physics and Chemistry Honours

First Year		Second Year	
As for Honours Physics	(15)	Physics 200, 206	(3)
		Physics 203, 209	(3)
		Chemistry 201, 202	(3)
		Chemistry 203	(3)
		Mathematics 200, 221, 315	(4½)
		Elective[1]	(1½)
			(18)

[1] It is recommended that Mathematics 201 be taken in the Second Year (Second Term).

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Third Year		Fourth Year[3]	
Physics 301, 308	(3)	Physics 307	(1)
Physics 303, 304	(3)	Physics 402	(1½)
Physics 309	(2)	Additional Physics per consultation[2]	(3)
Chemistry 304	(3)	Chemistry 311	(2)
Chemistry 310	(3)	Additional Chemistry per consultation[2]	(4)
Chemistry 312	(2)	Arts Elective	(3)
Mathematics 316	(1½)	Elective	(1)
	(17½)		(15½)

[2]These additional units should include either Chemistry 449 (3) and Physics 401 (1½) or Physics 449 (3) and Chemistry 401 or 407 (1½).
[3]To be implemented 1987/88. For 1986/87 add Physics 308 (1½), change Elective to (½) a unit for a total of 16½ units.

Combined Physics and Computer Science Honours
See Computer Science Programs

Combined Physics and Mathematics Honours[1]

First Year		Second Year	
As for Honours Physics	(15)	Physics 200, 203	(3)
		Physics 206, 209	(3)
		Mathematics 222, 225	(6)
		Science Elective	(3)
		Arts Elective	(3)
			(18)

Third Year		Fourth Year[2]	
Physics 301, 304	(3)	Physics 307	(1)
Physics 303, 306	(3)	Physics 308, 402	(3)
Physics 309	(2)	Physics 449	(3)
Mathematics 300	(3)	Additional Mathematics 6 units of approved 4th year courses	(6)
Mathematics 320	(3)		
Mathematics 323	(3)		
	(17)		(16)

[1]See Mathematics for language requirement.
[2]To be implemented 1987/88. For 1986/87 consult 1985/86 calendar.

Combined Physics and Oceanography Honours
See Oceanography Programs.

Primarily for First-Year Science Students

Physics 11 (B.C. Secondary School) or equivalent is now a prerequisite for all students entering the Faculty of Science. Students wishing to enter, but lacking Physics 11, should submit a special appeal to the office of the Registrar with their application forms for permission to take Physics 110.

Mathematics 100 and 101 (or 120 and 121), and a First-Year course in Physics (with laboratory) are prerequisite to all Second and higher year courses in Physics with the exception of Physics 340 and 341; (Physics 230 does not require Mathematics 101). Credit will be given for only one of the various First-Year Physics courses at the University of British Columbia, or for an equivalent lecture-and-laboratory Physics course which was taken at another institution.

Academic credit for one of Physics 110, 115 or 120 is a prerequisite for admission to the Physics Honours Program, the Physics Major Program, or for entrance into the Faculty of Applied Science. Physics 120, and a clear First-Year pass with **either** overall Second Class standing in 15 units, **or** at least a clear First-Year pass with not less than Second Class standing in **each** of Physics 120, Mathematics 100, Mathematics 101, and a First-Year Chemistry course, is the **desirable** prerequisite for admission to the Second-Year Honours Program in Physics. However, students who were not permitted to take Physics 120 may substitute the First-Year Physics course for which they received *academic credit*, provided **all** other minimum requirements as stated were also met.

Physics 110 is intended primarily for students who have completed **only** B.C. Secondary School Physics 11 or its equivalent.

Physics 115 is intended primarily for students who have completed B.C. Secondary School Physics 12. However, students who have achieved a 'B' grade or better in Physics 12 and who are well-prepared are encouraged to apply for enrolment in Physics 120.

Physics 120 is open only to students who have received credit for B.C. Secondary School Physics 12 with a 'B' grade or better, and who are particularly interested in and challenged by physical science and/or its application to other fields or disciplines. Special permission to enrol in Physics 120 must be granted by a Physics Departmental Adviser at registration, who will accept only the best-qualified candidates on the basis of clearly-documented academic records.

Students who would prefer to register in a 1st Year physics course with a higher number than the appropriate one as designated above, must obtain permission of the Physics Department.

Non-science students without Physics 11 but with adequate mathematics may be allowed to take Physics 110 at the discretion of the Department.

Primarily for 1st Year Students NOT in the Faculty of Science:— Physics 140 (3).

Primarily for Third- and Fourth-Year Students NOT in the Faculty of Science:—Physics 340 (3), 341 (1½), 440 (3).

Service Course for General Science Program, Pre-Architecture and Education Students:—Physics 326 (3).

Service course primarily for students not specializing in Physical Sciences or Engineering:—Physics 329 (1½).

PHYSIOLOGY

The Department offers opportunities for study leading to doctoral, master's and bachelor's degrees (Honours only). For information on the Ph.D. and M.Sc. degree programs, see the Faculty of Graduate Studies. For further information on other courses within the Department, consult the Faculty of Medicine section of the calendar.

Biology 101 or 102; Chemistry 110 or 120 and 203 or 230; Mathematics 100, 101 (120, 121) and Physics 110, 115, or 120 are prerequisite to all courses in Physiology.

Biochemistry 300 (or Biology 201/Biochemistry 302) and Physiology 301 and 302, or 303, or the equivalents, or consent of the Department are prerequisite to all courses in Physiology numbered 401 or higher.

Enrolment in Physiology 303 is available only to Physiology and Pharmacology Honours students. Admission is guaranteed only to those students who have a first class average in the required Biology and Chemistry courses in second year. The minimum requirement is a 72% cumulative average for the 33 units attempted in first and second years.

Requirements for the B.Sc. degree:

Honours

First Year		Second Year	
Biology 101 or 102	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 205, or 201 and 202	(3)
English 100	(3)	Chemistry 230 or 203	(3)
Mathematics 100, 101 (120, 121)	(3)	Mathematics 200	(1½)
Physics 110 or 115 or 120	(3)	Arts elective	(3)
		Science electives	(4½)
	(15)		(18)

Third Year		Fourth Year	
Biochemistry 301, 302	(3)	Physiology 422, 423, 424	(4½)
Biology 300	(1½)	Physiology 426	(1½)
Physiology 301	(3)	Physiology 430	(3)
Physiology 303	(1½)	Physiology 449	(3)
Arts Elective	(3)	Anatomy 405	(1½)
Electives	(4½)	Elective	(3)
	(16½)		(16½)

Suggested electives for the Honours Program in Physiology:

Biology 301 (1½).
Computer Science 101 (1½) or 114 and 116 (3).
Microbiology 200 (3).
Pharmacology and Therapeutics 390.
Psychology 260 (3).
Psychology 360 (3).
Zoology 304 (1½).
Zoology 428 (1½).

PSYCHOLOGY

The Department offers opportunity for study leading to bachelor's, master's, and doctoral degrees. For information on the B.A. degree courses see the Faculty of Arts. For information on the M.A. and Ph.D. degree courses, see the Faculty of Graduate Studies.

The B.Sc. program is specifically intended for those students whose interest in Psychology is in the biological basis of behaviour. The student with a major interest in the social, personality, developmental, clinical or general experimental areas of psychology should register for the B.A. degree.

Requirements for the B.Sc. degree

Students entering the Major or Honours program should obtain details of the structure of Psychology undergraduate courses from the Department office.

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*Students registered in Psychology programs must satisfy the Faculty of Science requirement of nine units of Arts by electing Faculty of Arts courses **other** than Psychology. Science electives may not be Psychology courses.*

In addition to Psychology 348 and 448, all Psychology courses numbered 60 or higher in the last two digits have Science credit.

Major

First Year[1]		Second Year	
Biology 101 or 102	(3)	Psychology 260	(3)
Chemistry 110 or 120	(3)	Three units from:	
English 100	(3)	Biology 200 (1½)	
Mathematics 100, 101 (120, 121)	(3)	Biology 201 (1½)	
Physics 110 or 115 or 120	(3)	Zoology 203 (1½)	
		Zoology 205 (1½)	(3)
		Chemistry 230 or 203	(3)
		Arts elective[2]	(3)
		Elective[2]	(3)
	(15)		(15)
Third Year		**Fourth Year**	
Psychology 360	(3)	Six units from:	
Psychology 366	(3)	Psychology 460, 463,	
Arts elective[2]	(3)	465, 466, 467	(6)
Science elective[2,3]	(3)	Psychology elective	(3)
Elective[2]	(3)	Science elective[2,3]	(3)
		Elective[2,3]	(3)
	(15)		(15)

[1]Psychology 100 recommended if student has prior credit for any of the required courses. Students of exceptional ability may, with permission of the Dean, take 18 units including Psychology 100.

[2]Recommended non-psychology electives: Biochemistry 300 (3), 302 (1½); Biology 321 (1½), 322 (1½), 330 (3), 334 (1½); Chemistry 205 (3); Classical Studies 301 (1½); Computer Science 101 (1½), 114 (1½),116 (1½), 118 (1½), 302 (3); English 301 (1½), 302 (1½); Mathematics 200 (1½), 221 (1½), 318 (3), 344 (1½); Pharmacology 390 (3); Philosophy 214 (3), 407 (1½); Physics 326 (3), 329 (1½); Physiology 301 (3), 426 (1½); Statistics 304 (1½); Zoology 303 (3), 304 (1½), 306 (1½), 323 (1½), 408 (1½), 423 (1½), 429 (1½), 431 (1½). General electives may be Psychology courses; Arts electives and Science electives may not.

[3]Must be numbered 300 or above and selected in consultation with Program Adviser.

Honours

First Year[1]		Second Year	
Biology 101 or 102	(3)	Psychology 260	(3)
Chemistry 110 or 120	(3)	Three units from:	(3)
English 100	(3)	Biology 200 (1½)	
Mathematics 100, 101		Biology 201 (1½)	
(120, 121)	(3)	Zoology 203 (1½)	
Physics 110 or 115 or 120	(3)	Zoology 205 (1½)	
		Chemistry 230 or 203	(3)
		Arts elective[2]	(3)
		Elective[2]	(3)
	(15)		(15)
Third Year		**Fourth Year**	
Psychology 312	(3)	6 units from:	
Psychology 360	(3)	Psychology 460, 463, 465,	
Psychology 366	(3)	466 and 467	(6)
Arts elective[2]	(3)	Psychology 449	(3)
Science elective[2,3]	(3)	Psychology elective	(3)
Elective[2]	(3)	Science elective[2,3]	(3)
		Elective[2,3]	(3)
	(18)		(18)

[1]Psychology 100 recommended if student has prior credit for any of the required courses. Students of exceptional ability may, with permission of the Dean, take 18 units including Psychology 100.

[2]Recommended-non psychology electives: Biochemistry 300 (3), 302 (1½); Biology 321 (1½), 322 (1½), 330 (3), 334 (1½); Chemistry 205 (3); Computer Science 101 (1½), 114 (1½), 116 (1½), 118 (1½), 302 (3); English 301 (1½), 302 (1½); Mathematics 200 (1½), 221 (1½), 318 (3), 344 (1½); Pharmacology 390 (3); Philosophy 214 (3), 407 (1½); Physics 326 (3), 329 (1½); Physiology 301 (3), 426 (1½); Statistics 304 (1½); Zoology 303 (3), 304 (1½), 306 (1½), 323 (1½), 408 (1½), 423 (1½), 429 (1½), 431 (1½). General electives may be Psychology courses; Arts electives and Science electives may not.

[3]Must be numbered 300 or above and selected in consultation with Program Adviser.

STATISTICS

The Department of Statistics offers programs of study leading to bachelor's, master's and doctoral degrees. For information on the M.Sc. and Ph.D. degree programs, see the Faculty of Graduate Studies section of this Calendar. Before registering for each of the second, third and fourth years, evey student who intends to commence or continue any of the programs listed below must consult an adviser in the Statistics Department.

The Statistical Consulting and Research Laboratory, operated by the Department of Statistics, is intended to provide statistical advice to the University's faculty and, with the approval of their supervisers, to graduate students working on research problems. In providing this service to the University community, the Department hopes to foster interdisciplinary collaboration in research projects involving statistics. The Statistical Consulting and Research Laboratory also acts as a statistical research support unit and provides students in statistics with opportunities for actively learning to apply statistics.

Requirements for the B.Sc. degree:

Major in Statistics

First Year		Second Year	
Mathematics 100, 101		Statistics 200	(1½)
(120, 121)	(3)	Statistics/Mathematics 205	(1½)
Chemistry 110 or 120	(3)	Mathematics 200, 220, 221	(4½)
Physics 110 or 115 or 120	(3)	Arts Elective	(3)
English 100	(3)	Electives	(4½)
Computer Science 114, 116[1]	(3)		
	(15)		(15)

Third and Fourth Years

In the third year: Statistics 305, 306 and Mathematics 307	(4½)
In the fourth year: Statistics 404, 405	(3)
Statistics 308	(1½)
Statistics courses numbered 300 or above	(3)
Statistics courses numbered 400 or above	(3)
Mathematics courses numbered 300 or above	(1½)
Computer Science courses numbered 300 or above[2]	(3)
Arts Elective	(3)
Electives	(7½)
	(30)

[1]May be deferred until second year. Computer Science 118(1½) and a 1½ unit elective can be substituted by those eligible for Computer Science 118.

[2]Selections from Computer Science 302, 315, 322, 402, 404, 405, 406, 414, 420 are recommended. Note that many of these courses have 200-level Computer Science courses as prerequsites.

Honours in Statistics

First Year		Second Year	
Mathematics 120, 121		Statistics 200	(1½)
(100, 101)	(3)	Statistics/Mathematics 205	(1½)
Chemistry 120 or 110	(3)	Mathematics 220, 221	(3)
Physics 120 or 115 or 110	(3)	Mathematics 225 (200, 201)	(3)
English 100	(3)	Arts Elective	(3)
Computer Science 114, 116[1]	(3)	Electives	(4½)
	(15)		(16½)

Third and Fourth Years

In the third year: Statistics 305, 306, 308 and Mathematics 307[2], 320	(9)
In the fourth year: Statistics 404, 405, 406 and 3 units chosen from Mathematics 418, 420 and Statistics courses numbered 400 or above	(9)
Statistics courses numbered 300 or above	(1½)
Statistics courses numbered 400 or above	(1½)
Additional courses chosen from Computer Science and Mathematics courses numbered 300 or above	(3)
Arts Elective	(3)
Electives	(7½)
	(34½)

[1]May be deferred until second year. Computer Science 118(1½) and a 1½ unit

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elective can be substituted by those eligible for Computer Science 118.
[2]Students seeking an emphasis in Mathematics are encouraged to substitute Mathematics 322.

Combined Honours in Mathematics and Statistics[1]

First Year		Second Year	
Mathematics 120, 121 (100, 101)	(3)	Statistics 200	(1½)
Chemistry 120 or 110	(3)	Statistics/Mathematics 205	(1½)
Physics 120 or 115 or 110	(3)	Mathematics 220, 221, 315	(4½)
English 100	(3)	Mathematics 225 (200, 201)	(3)
Computer Science 114, 116[2]	(3)	Arts Elective	(3)
		Electives	(3)
	(15)		(16½)
Third Year		**Fourth Year**	
Statistics 305, 306, 308	(4½)	Statistics 404, 405, 406	(6)
Mathematics 300, 320	(6)	6 units from Mathematics 400, 418, 420-426	(6)
One of Mathematics 322 or 316/345	(3)	Electives[3]	(4½)
Arts Elective	(3)		
Elective[3]	(1½)		
	(18)		(16½)

[1]See Mathematics for language requirement.
[2]May be deferred until second year. Computer Science 118(1½) and a 1½ units elective can be substituted by those eligible for Computer Science 118.
[3]Electives in the third and fourth year must include at least 3 units selected from Statistics courses numbered 300 or above.

ZOOLOGY

The Department offers programs leading to bachelor's, master's and doctoral degrees. For information on the Ph.D. and M.Sc. degree programs, see the Faculty of Graduate Studies. All students who intend to take Honours in Zoology must consult the Head of the Department.

Students interested in a program in **Ecology** can follow a course of study in Botany, Zoology or Biology (General Biology, Option III). Recommendations on the selection of courses can be obtained from ecology advisers in Botany, Zoology or the Biology program.

Requirements for the B.Sc. Degree:

Biology 101 or 102 is a prerequisite to all courses with the exception of Zoology 400.

First-Year Major and Honours

The program is identical to the first year Biology program.

Major

Second Year		Third Year and Fourth Year	
Biology 200, 201	(3)	At least 15 units of Zoology or Biology courses must be taken at the 300- or 400-level, to include 9 units chosen from Biology 300, 321, 322, 334, Zoology 303, 304, 305, 306, 323, 402.	(15)
Zoology 203, 205	(3)	Arts elective	(3)
Chemistry 230	(3)	Electives (to make total of 15 units in each year)	(12)
Arts elective	(3)		
Elective	(3)		
	(15)		(30)

Honours

Second Year		Third Year		Fourth Year	
Biology 200, 201	(3)	Biology 321, 334	(3)	Biology 300	(1½)
Zoology 203, 205	(3)	Zoology 303	(3)	Zoology 402	(1½)
Chemistry 230	(3)	Zoology 304	(1½)	Zoology 440	(1½)
Arts elective	(3)	Zoology elective[1,2]	(3)	Zoology 449	(3)
Elective	(3)	Arts elective	(3)	Zoology elective[1]	(3)
		Electives	(4½)	Science electives	(4½)
				Elective	(3)
	(15)		(18)		(18)

[1]Biology or Marine Science courses may be substituted for Zoology.
[2]Zoology 340 recommended.

Combined Zoology and Oceanography Honours
See Oceanography Programs

Biology courses are also accepted as credit in Zoology.

Certain courses in Marine Science are offered by the Western Canadian Universities Marine Biological Laboratory (at Bamfield on Vancouver Island) during Spring and Summer Sessions. Up to 6 units of credit courses may be taken at the Bamfield Marine Station in the spring or summer period preceding registration for the Fourth Year. For details, please consult Department.

Facilities are available for advanced study and research in the following areas: Biological Oceanography, Comparative Physiology, Developmental and Cell Biology, Entomology, Ethology, Genetics, Ichthyology and Limnology, Parasitology, Population and Community Ecology, Vertebrate and Invertebrate Zoology, and Zoogeography. Attention is also directed to the following applied fields of Zoology and students should consult the appropriate adviser for approval of programs in these areas.

Entomology

Courses of study are offered through the Department of Zoology and the Faculties of Forestry and Agricultural Sciences. Zoology offers introductory and advanced courses in entomology and maintains a museum collection and specialized library. Forestry has courses in insect ecology and in the special problems of forest entomology and forest protection. In Agricultural Sciences, the Department of Plant Science offers courses in economic entomology, biometerology, insect physiology, pesticides, biological control, and plant-disease vectors.

At the graduate level, there is research guidance in problems relating to the classification, structure, function and bionomics of insects, as well as in special areas, such as biological control, biochemical genetics, and plant-insect relationships. There are also opportunities for research at the Institute of Animal Resource Ecology in population biology, ecological genetics, and mathematical modelling of biological processes. Co-operative research on the ultrastructure, biology, or population dynamics of plant-disease vectors can be arranged through the Entomology Section of the Research Branch of Agriculture Canada, which maintains a large laboratory on campus.

Fisheries

Students desiring training in various fields related to fisheries may obtain instruction by a judicious selection of courses offered in various departments of the University. Courses in Oceanography form an important part of the graduate work in fisheries biology.

Wildlife Management

Courses of study permitting a student to enter this field of applied zoology can be obtained either through the B.Sc. degree, the B.Sc. (Agr.) degree, or the B.S.F. degree. In each instance the Master's degree is essential and students should not attempt to enter the field unless they can meet the academic requirements for it. Facilities for field studies include the Thacker Research Area at Hope, B.C., with 280 acres of varied terrain.

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THE SCHOOL OF SOCIAL WORK

(A School within the Faculty of Arts)

ADMINISTRATIVE STAFF

Director of the School	GLENN DROVER
Coordinator of Field Instruction	KLOH-ANN AMACHER
Coordinator of Continuing Education	BEN CHUD
Administrative Officer	SUSAN COLE MARSHALL
Librarian	JUDITH FRYE

ACADEMIC STAFF

Professors

JOHN A. CRANE, B.A. (Manitoba), M.S.W. (McGill), Ph.D. (Minnesota)
GLENN DROVER, B.A. (Toronto), B.Th. (Wycliffe College), M.S.W. (Fordham), Ph.D. (London School of Economics)
DONALD G. FINLAY, B.A., M.S.W. (Toronto), Ph.D. (Chicago)
RICHARD NANN, B.A. B.S.W. (Brit. Col.), M.S.W. (Columbia), D.S.W. (Calif., Berkeley)

Associate Professors

KLOH-ANN AMACHER, B.S. (Oregon), M.S.W. (Calif., Berkeley), D.S.W. (Smith)
BEN CHUD, B.A. (Queen's), M.S.W. (Brit. Col.)
DAVID S. FREEMAN, B.A. (Calif. State, Los Angeles), M.S.W., D.S.W. (Calif., L.A.)
ANNE FURNESS, B.A. (McGill), M.S.W. (Brit. Col.), D.S.W. (Calif., L.A.)
DENNIS T. GUEST, B.A., M.S.W. (Brit. Col.), Ph.D. (London)
JOHN A. MACDONALD, B.A., LL.B., B.S.W. (Brit. Col.), M.S.W. (Washington)
CHRISTIANE McNIVEN, B.A. (Lille), M.S.W. (Ottawa), D.S.W. (Columbia)
MARY RUSSELL, B.A., B.S.W., M.S.W. (Brit. Col.), M.A., Ph.D. (Simon Fraser)
ELAINE STOLAR, M.A., M.S.W. (Brit. Col.)

Assistant Professors

JOHN DEAKINS, B.A. (London), M.A., Ph.D. (Chicago)
HAROLD G. GOODWIN, B.A. (Mount Allison), M.S.W. (Brit. Col.)
GARRY D. GRAMS, B.A., M.S.W. (Brit. Col.)
P. ROSS MCCLELLAND, B.A., B.Com. (Queen's), M.S.W. (Toronto)
ROOP SEEBARAN, B.A., B.S.W., M.S.W. (Brit. Col.)

Assistant Professors, Part-time

MILES BUCKMAN, B.A. (Loyola), M.S.W. (Carleton), M.A., Ph.D. (Wisconsin)
WAYNE WRIGHT, B.Sc., M.Sc. (Utah State-Logan), M.S.W., Utah (Salt Lake City)

Field Placement Agencies

ACTION COMMUNITY TODAY (ACT)
ALTERNATIVES PROGRAM
BC ASSOCIATION OF SOCIAL WORKERS
BIG BROTHERS
BOYS & GIRLS CLUBS OF VANCOUVER
BRITANNIA COMMUNITY SERVICES
BROWNDALE CARE SOCIETY
BURNABY GENERAL HOSPITAL
BURNABY YOUTH SERVICES
CANADIAN MENTAL HEALTH ASSOCIATION
CHILDREN'S HOSPITAL
COMMUNITY LIVING SOCIETY
DOWNTOWN EASTSIDE RESIDENTS ASSOCIATION
ELIZABETH FRY SOCIETY
FALSE CREEK RESIDENCE
FAMILY SERVICES OF GREATER VANCOUVER
FIRST UNITED CHURCH
FRASER CORRECTIONAL RESOURCES
FROG HOLLOW NEIGHBOURHOOD HOUSE
G.F. STRONG REHABILITATION CENTRE
GREATER VANCOUVER MENTAL HEALTH SERVICES
INLAND REFUGEE CENTRE
INTERLOCK
JUSTICE INSTITUTE OF B.C.
KEITH LYNN ALTERNATIVE SCHOOL
KITSILANO HOUSE
KIWASSA NEIGHBOURHOOD SERVICES
LITTLE MOUNTAIN NEIGHBOURHOOD HOUSE
LOUIS BRIER HOME
MARGARET FULTON CENTRE
MINISTRY OF THE ATTORNEY GENERAL — CORRECTIONS BRANCH
MINISTRY OF HEALTH: ALCOHOL & DRUG PROGRAMS, MENTAL HEALTH CENTRES
MINISTRY OF HUMAN RESOURCES
MSA HSOPITAL
MOUNT PLEASANT NEIGHBOURHOOD HOUSE
MOUNT ST. JOSEPH'S HOSPITAL
NORTH SHORE COUNSELLING CENTRE
NORTH SHORE FAMILY SERVICES
PEARSON HOSPITAL
REHABILITATION AND COUNSELLING SERVICES
RIVERVIEW HOSPITAL
ROYAL COLUMBIAN HOSPITAL
SALTSPRING COMMUNITY SERVICES
SHAUGHNESSY HOSPITAL
SOUTH VANCOUVER NEIGHBOURHOOD HOUSE
ST. PAUL'S HOSPITAL
ST. VINCENT'S HOSPITAL
STRATHCONA PROPERTY OWNERS & TENANTS ASSN. (SPOTA)
SURREY MEMORIAL HOSPITAL
UBC HEALTH SCIENCES CENTRE
UNITED CHURCH OF CANADA
UNITED WAY OF THE LOWER MAINLAND
VANCOUVER GENERAL HOSPITAL
VANCOUVER HEALTH DEPARTMENT
VANCOUVER REGION ASSN. FOR MENTALLY HANDICAPPED PERSONS
VANCOUVER SOCIAL PLANNING DEPARTMENT
VANCOUVER UNEMPLOYMENT ACTION CENTRE
WESTERN INSTITUTE FOR THE DEAF
WILSON CREEK FAMILY CENTRE
Y.W.C.A.

1986-87

THE SCHOOL OF SOCIAL WORK

The School of Social Work offers three degree programs: an undergraduate program leading to the B.S.W., the first professional degree in Social Work; a related program designed to provide persons with a B.A. or equivalent degree with the opportunity to undertake studies leading to the B.S.W. degree; and a graduate program for persons with a B.S.W. or equivalent degree, leading to the M.S.W. degree.

Specific information on these programs is available from the School's Administrative Officer.

The School is a member of the Canadian Association of Schools of Social Work (C.A.S.S.W.), the policy and standard-setting organization for social work education at the university level in Canada. All the School's degree-programs are accredited.

Although the School's degree programs do not include a required course in first aid, the School encourages all Social Work students to secure first aid training. Information on such training is available from the School's Administrative Officer.

BACHELOR OF SOCIAL WORK PROGRAM

Educational Objectives

The Bachelor of Social Work program has two main educational objectives:

1. To provide students with the knowledge and skills necessary to beginning professional practice in social work roles at the individual, family and small group or community level.
2. To prepare selected students for entry into more advanced professional studies at the graduate level appropriate to such social work functions as consultation, policy development and program planning, research, and administration.

Admissions

1. Admission to the B.S.W. program will normally follow completion of the first two years of the Bachelor of Arts program at the University of British Columbia, or its equivalent at another university or community college.
2. The applicant to the B.S.W. program will be required:
   (a) To have achieved at least a 65% average during the academic year (or equivalent) preceding application for admission.
   (b) To have completed at least three units of course work in each of two areas of knowledge subsumed under the broad headings of Social Issues and Problems in Contemporary Perspective; and Dynamics of Human Behaviour, Individual or Collective.
   (c) To demonstrate to the satisfaction of the School personal potential and suitability for a career in social work.
3. Although not a requirement of admission, a 1½ unit course in statistics is a degree requirement. Applicants are strongly urged to complete this requirement before applying.
4. The deadline for applications is the end of February. Application forms must be obtained from the School.
5. For second year students considering application to the program, the School's faculty provides a consultant and advisory service.
6. Given resource limitations, the School may not be able to accept all applicants who meet the foregoing admission requirements.

Pattern of Courses

First and Second Year	Units
The first two years of the B.A. program at U.B.C. (or its equivalent at another university or community college), including at least a 1½ unit course in statistics and at least six units of course work concerned with:	
(a) Social Issues and Problems in Contemporary Perspective* - 3 units	
(b) Dynamics of Human Behaviour, Individual or Collective* - 3 units	
Total	30

Third Year	
(a) 300. - Canadian Social Services I	3
(b) 310. - Social Work Intervention I	6
(c) 320. - Social Work Research	3
(d) 335. - Human Behaviour and Social Environment	3
Total	15

Fourth Year	
(a) 400. - Canadian Social Services II	1½
(b) 410. - Social Work Intervention IIA:	6
OR	
415. - Social Work Intervention IIB:	
(c) Arts — Elective course(s) in the Social Sciences*	3
(d) SOWK 430 Special Studies in Social Work and/or coursesin the Social Sciences and the Humanities.*	4½
Total	15

* Details on Elective courses in Fourth Year are available on request from the School of Social Work.

B.S.W. Program for Persons with a B.A. or Equivalent Degree

Program Objectives

The program is designed to provide persons with a B.A. or equivalent degree with the opportunity to undertake studies leading to the B.S.W., the first professional degree in Social Work. The educational objectives of this program are identical with those of the regular B.S.W. program. A limited number of part-time students may be admitted to the program.

Admissions

1. The minimum requirement for admission is a B.A. or equivalent degree awarded by, or acceptable to, the University of British Columbia. The B.A. must include 12 units of required course work in the Social Sciences*.
2. Although not a requirement of admission, a 1½ unit course in statistics is a degree requirement. Applicants are strongly urged to complete this requirement before applying.
3. The following will enhance the applicant's prospects for admission.
   (a) A high academic average in previous degree course work.
   (b) Prior courses in Social Work.
   (c) A high average on ratings of personal suitability and potential for Social Work.
   (d) Relevant work experience.
4. The deadline for application is January 31. Application forms must be obtained from the School.
5. Given resource limitations, the School may not be able to accept all applicants who meet the foregoing admission requirements.

Pattern of Courses

1. (a) The B.S.W. program for persons with a B.A. or equivalent degree involves the following pattern and sequence of Social Work courses:

	Units
SOWK 300 - Canadian Social Services I	3
SOWK 310 - Social Work Intervention I .	6
SOWK 320 - Social Work Research	3
SOWK 336 - Social Sciences and Social Work Practice	1½
SOWK 400 - Canadian Social Services II	1½
SOWK 410 - Social Work Intervention IIA	
OR	
SOWK 415 - Social Work Intervention IIB	6
TOTAL	21

   (b) Persons admitted to the program who can demonstrate prior knowledge in SOWK 300, 400 or 336 may apply for exemption from the particular course but must complete Social Work courses of the equivalent unit value.
2. The program involves nine months of full-time study, beginning with the opening of First Term in September.

* A list of Social Science courses to meet this requirement is available from the School of Social Work.

MASTER OF SOCIAL WORK DEGREE

For general information on the School's one-year or part-time M.S.W. program, see the listing under the Faculty of Graduate Studies. More specific information on the program plan is available from the School.

Social Work Students' Association

Through this organization, all social work students participate directly in the affairs of the School through membership on many policy committees. In addition, the Association maintains a roster of its own committees, conducts curriculum reviews, arranges for visiting speakers and social gatherings, and participates in social action projects. The Association has established liaison with the B.C. Association of Social Workers.

1986-87

COURSES OF INSTRUCTION

Descriptions of all regular courses offered in the University may be found in the following section. Departments are arranged alphabetically.

Numbering of courses

In most Faculties the courses numbered 100 to 199 are primarily for First Year students, those numbered 200 to 299 are primarily for Second Year students; similarly 300 to 399 for Third Year students and 400 to 499 for Fourth Year students. Courses numbered 500 and above are exclusively for graduate students and are only available to undergraduates by permission of the departments concerned. Where Faculties have a different style of classification of courses the level of study is indicated in the description of their study programs.

Credit and hours

In the course descriptions the "unit value" of a course, where given, is shown in parentheses following the course number. In general a "unit" represents one hour of instruction or 2 to 3 hours of laboratory work per week throughout both terms of a winter session (September to May). A unit is approximately two semester hours of credit.

The number of hours assigned each week to lectures (first digit) and to laboratory, discussion or tutorial seminars (second digit) are shown in brackets at the end of a course description. Where a third digit appears it refers to periods where assigned problems are done. An asterisk (*) indicates alternate weeks. The first set of digits refers to the first term (September to December) and the second set to the second term (January to May); when only one set is given it means either term. Graduate courses and courses in some faculties are not so designated.

Courses with variable units

Some courses are listed with a choice of unit value; the form: (1-3) implies that the course may be given for any number of units from 1 to 3 inclusive; the form: (1/3) implies that the course will be given either for 1 unit or for 3 units.

Where the parentheses are followed immediately by **"c"** — the unit value of the course taken by any student will be determined in consultation with the department offering the course and the Faculty in which the student is enrolled.

Where the parentheses are followed immediately by **"d"** — the unit value of the course in any particular session will be determined by the department offering the course. In all cases, the maximum unit value is that which may be obtained by a student during the complete program of study, (i.e. it is not the maximum for a given year.)

Prerequisites

If specific studies are required as background to a certain course they are described under "prerequisites" in the course description. In some instances prerequisites may be waived at the discretion of the instructor. General prerequisites that apply to all courses in a list are frequently given just before the list. In a dispute over the adequacy of prerequisites the course instructor will make the decision. In all cases where prerequisites are indicated the implication is "or the equivalent" and "or the consent of the instructor."

Where prerequisites are not indicated the permission of the department is required.

Offering of Courses

Not all courses listed are offered each year. Most courses to be offered in a winter session, as well as places and times of class meeting and names of instructors, appear in a publication "Registration Guide and Schedule of Courses" available to all students qualified to register. For those not so listed enquiry should be made of the department concerned.

Adult Education (Faculty of Education)

313. (3) *Organization of Adult Basic Education Programs.*—Rationale, structures, and functions of basic education programs for adults with less than Grade 12 completion. Prerequisite: third year standing. [3-0; 3-0]
314. (3) *Adult Correctional Education.*—Planning prison education methods and techniques as they are affected by historical, philosophical, structural, and organizational contexts of penal institutions. Prerequisite: third year standing. [3-0; 3-0]
327. (1½) *Instructional Techniques for Teaching Adults.*—Description, conditions for effective use, and applications to specific circumstances of various instructional techniques. Practical use of the techniques in settings of instruction for adults is emphasized. (Credit may not be obtained for more than one of Adult Education 412 or 327 and 328.) [3-0; 0-0]
328. (1½) *Institutions of Adult Education.*—The history, roles, and activities of institutions in the field of adult education. Institutions in Canada, Great Britain, and the United States are emphasized, and some experiences in other countries are examined. (Credit may not be obtained for more than one of Adult Education 412 or 327 and 328.) [3-0; 0-0]
329. (1½) *Developing Short Courses, Workshops, and Seminars.*—Organization and administration of adult education events such as short courses, seminars, workshops, conferences and institutes. [0-0; 3-0]
330. (1½) *The Community Practice of Adult Education.*—Community based adult education with particular emphasis on the application of knowledge of the social, economic, cultural and political environment in developing and conducting adult education programs with and for individuals and groups. [0-0; 2-3]
375. (3) *Diploma Seminar and Internship in Adult Education.*— [3-0; 3-0]
412. (3) *Introduction to Adult Education.*—Survey of present programs for adult education including study of methods, institutions, and conditions under which they have developed in modern society. Students may not obtain credit for more than one of Adult Education 412 or 327 and 328. [3-0; 3-0]
500. (1½) *Foundations of Adult Education.*—The philosophical and historical foundations of the field of adult education. Prerequisite: ADED 412.
501. (1½) *Adult Education and Society.*—The interrelationship of adult education and social , economic and political developments. Examination of research literature and policy issues. Prerequisite: ADED 500.
502. (1½) *History of Canadian Adult Education.*—Selected topics in the history of adult education in Canada, with some emphasis on British Columbia, and on the relationships between adult education and other factors influencing the development of Canadian society.
503. (1½) *International Dimension of Adult Education.*—International perspectives on policy formulation, allocation of resources, design and delivery of adult education throughout the world. Special emphasis on emerging educational innovations.
508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.
514. (1½) *Adult Education Program Planning Theory.*—Theoretical and conceptual perspectives on planning and evaluating educational programs for adults. Exploration of the theoretical basis and utility of various approaches to planning and evaluation. (Same as AGEC 514.)
515. (1½) *Adult Education Program Planning Practice.*—Application of planning and evaluation principles in specific adult education settings. Exploration of the practical utility of various approaches to planning and evaluation. Prerequisite: ADED 514. (Same as AGEC 515.)
516. (1½) *Administration of Adult Education Agencies.*—Selected organizational and administrative theories, processes and practices relevant to the management of adult education agencies. Administration of formal, nonformal and informal adult education.
518. (1½) *Theory and Research on Adult Learning.*—Critical examination of theory and research on adult learning in formal, nonformal, and informal education settings.
519. (1½) *Theory and Research on Adult Instruction.*—Critical examination of theory and research on adult instruction in formal, nonformal, and informal education settings. Prerequisite: ADED 518.
525. (1½/3)**d** *Educational Gerontology.*—The role of education for populations of older adults and of education of aging, research on cognitive development across the life-span, and studies of role transitions and adaptation in the later years are investigated from the perspective of life-span eduation. Prerequisites: PSYC 322 or ADED 412, and ADED 518.
561. (1½-6)**d** *Laboratory Practicum.*
565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.
580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.
583. (1½/3)**d** *Advanced Seminar in Adult Education.*—Discussion of various projects in research or organization carried out by students. Prerequisite: ADED 500, 514 and 518.
598. (1½-6)**d** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.
599. (3/6)**c** *Master's Thesis.*
699. *Doctoral Thesis.*

Agricultural Economics

(Faculty of Agricultural Sciences)

201. (1½) *Introduction to Farm and Business Management.*—Concepts and principles. Farm organization and operation, capital and labour requirements, budgeting, opportunity cost, enterprise combination, appraisal, and revenue. Prerequisite: Economics 100 or consent of instructor. [3-1; 0-0]
258. (1½) *Introduction to Agricultural Economics.*—Economic analysis for food production and marketing in Canada and around the world. [0-0-0; 3-0-1]

260. (1½) *Introduction to Analytical Methods in Agricultural Economics.* — Linear and non-linear optimizing methods useful in understanding concepts, analysis and policy. Prerequisite: Mathematics 100 or 140. [2-2; 0-0]

302. (1½). *Farm Management II.*—Use of farm planning models. Adjustments to risk, capital budgeting. Prerequisite: Agricultural Economics 201 and 258. [0-0; 3-2]

306. (1½) *Agricultural Market Organization.*—Structure, conduct and performance in agricultural markets. Marketing margins, legislation, marketing boards and co-operatives. Historic attempts to improve market channels and achieve market power. Prerequisite: Agricultural Economics 258 or equivalent. [3-0; 0-0]

310. (1½) *Managerial Economics.*—Economic analysis applied to business decisions. Functions of the business economist. Forecasting, portfolio selection, profit and capital management, cost and revenue control, demand analysis and advertising, replacement theory, scheduling, tactical and strategic alternatives. Prerequisite: Economics 100 or Agricultural Economics 258. [3-0; 0-0]

340. (1½) *Rural Development.*—The economic causes and consequences of slow growing rural regions. Legislation, welfare measures, disguised unemployment, education, taxation and population changes. Methods for initiating and stimulating growth. [0-0; 3-0]

361. (1½) *Linear Programming in Agriculture.*—Applications of linear programming. Introduction to the concepts, graphic solution, the simplex procedure, basic theorems, primal and dual solutions. Setting up problems, computing, interpreting the results. Prerequisite: Mathematics 100 or 140. [0-0; 2-2]

374. (1½) *Land Economics.*—Economic analysis applied to problems of land use. Rent theory, land evaluation, land conservation. Techniques for assessing economic efficiency of land use. Effects of institutions and public policies on land use. Prerequisite: Economics 100. (Same as Economics 374.) [3-0; 0-0]

400. (2) *Enterprise Evaluation.*—Observing, recording and evaluating economic performance and profitability of local agricultural firms. Laboratory only. Prerequisite: Consent of instructor. [0-4; 0-4]

401. (1½) *Extension Methods.*—An introduction to practices and policies of agricultural extension. Aspects of adult learning, community organization, mass communications, and major agencies of extension will be considered. [2-2; 0-0 or 0-0; 2-2]

403. (3) *The Organization of Rural Society.*—Characteristics of people, groups and organizations; dimensions of the rural community, nature and direction of community development. Prerequisite: Sociology 200 or consent of instructor. [3-0; 3-0]

407. (1½) *Agricultural Market Prices.*—Determinants of farm prices and income, policies designed to influence market prices and returns to farmers, price fluctuations and cycles, price analysis and forecasting, fitting supply and demand functions. Prerequisite: Economics 326. [3-0; 0-0]

411. (1½) *Managerial Economics Under Uncertainty.*—Concepts of classical and Bayesian probability applied to economic problems in managerial economics. Useful distributions, opportunity loss, conditional and joint probability, decision rules, costs of uncertainty, value of information, bidding and games in oligopoly. Prerequisite: Consent of the instructor. [0-0; 3-0]

415. (1½) *Animal Economics.*—Study of animal science and economic parameters; their use in design of primary production systems for growth, nutrition, reproduction, lactation and genetic improvement. Decision-making under various biological and economic constraints, options and opportunities. (Not offered every year.) [0-0; 3-0]

416. (1½) *Economics of Horticultural Crops.*—Economic importance of horticultural crops. Business management principles in horticultural production. Location, transportation, processing and market organizations. Problems in relation to policy and legislation. Prerequisite: Agricultural Economics 258 or consent of instructor. [3-0; 0-0]

420. (1½) *Agricultural Policy.*—Goals, policies and programs for agriculture in B.C. and Canada.—Existing policies, alternative policies, institutions and their effects. Economic research for policy formulation. Prerequisite: Consent of instructor. [0-0; 3-0]

421. (1½/3)**d** *Topics in Agricultural Economics.*—A lecture course dealing with current topics of interest.

423. (1) *Seminar.*—Application of economic analysis to contemporary problems in agricultural economics. [1-0; 1-0]

430. (1-3)**c** *Directed Studies.*—On an approved problem.

498. (1½) *Undergraduate Essay.*—Preparation of a comprehensive and analytical review of an approved topic under the supervision of a faculty member. Prerequisite: Approval of the Head of Department. Consult before the end of classes in third year.

499. (3) *Undergraduate Thesis.*—Design and execution of an experimental/analytical research project leading to preparation of a thesis. Prerequisite: Approval of the Head of Department. Consult before the end of classes in third year.

500. (1-3)**c** *Graduate Seminar.*

501. (1½) *Agricultural Price Analysis.*—Theoretical and quantitative analysis of agricultural markets; empirical studies of demand for agricultural commodities and measurement of farm supply response. Prerequisite: Consent of Instructor.

502. (1½) *Agricultural Market Institutions.*—Organization of the agricultural industry. Implications of structure, conduct and performance for farm supplier, farmer, wholesaler, retailer and consumer. Prerequisite: Consent of Instructor.

503. (1½/3)**d** *Agricultural Problems and Policy.*—Influential doctrines in agricultural policy; problems of economic efficiency and welfare. Critical review of present and proposed price and income policies.

508. (1½) *Advanced Production Analysis.*—Analytical and research procedures in production economics. Activity analysis. Production and supply functions. Simulation.

514. (1½) *Adult Education Program Planning Theory.*—Theoretical and conceptual perspectives on planning and evaluating education programs for adults. Exploration of the theoretical basis and utility of various approaches to planning and evaluation. (Same as ADED 514.)

515. (1½) *Adult Education Program Planning Practice.*—Application of planning and evaluation principles in specific adult education settings. Exploration of the practical utility of various approaches to planning evaluation. Prerequisite: AGEC 514. (Same as ADED 515).

521. (1½/3)**d** *Topics in Agricultural Economics.*—A lecture course dealing with current topics of interest.

530. (1-3)**c** *Directed Studies.*—On an approved problem.

540. (1½) *Agriculture in the Developing Economies.*—Role of agriculture in economic development. Technology, culture and institutions in developing countries—their relationship to agricultural development. Policies and Problems.

549. (6) *Master's Thesis.*

Agricultural Mechanics

(Faculty of Agricultural Sciences)

The following undergraduate courses will be offered for the last time in the 1987-88 session.

423. (1) *Seminar.*—Presentation of papers, student theses and current topics.

430. (1-3)**c** *Directed Studies.*

499. (3) *Undergraduate Thesis.*—Design and execution of an experimental/analytical research project leading to preparation of a thesis. Consult with the Head of Department before the end of classes in third year.

Agricultural Sciences (Faculty of Agricultural Sciences)

100. (0) *Introduction to Agricultural Sciences*—Orientation to study and career programs; survey of professional opportunities and requirements [1-0-0; 0-0-0]

110. (1½) *Introduction to Food Production Systems*—A study of the fundamental concepts and principles underlying food production systems [0-0-0; 3-2-0]

199. (0) *Work Placement I*—Approved and supervised technical work experience in the food and agriculture sector for a minimum of 3½ months. (Normally completed during the summer preceding Second Year Agricultural Sciences.) Technical report required. Restricted to students meeting the requirements of the Faculty of Agricultural Sciences and the Co-operative Education Program.

213. (1½) *Genetics in Agriculture.*—The principles of genetics as applied to plants, animals and poultry. The inheritance of specific characters and the use of genetic variability to improve production of agricultural species. [0-0; 3-0-2]

299. (0) *Work Placement II.*—Approved and supervised technical work experience in the food and agriculture sector for a minimum of 3½ months. (Normally completed during the summer preceding Third Year Agricultural Sciences.) Technical report required. Restricted to students meeting the requirements of the Faculty of Agricultural Sciences and the Co-operative Education Program.

300. (1) *Field Trip.*—Observing, recording and correlating agricultural facts in the field. One week of work is required of all students prior to Third Year entry. Staff and other members of the B.C. Institute of Agrologists. A fee will be assessed each student to cover the cost. (See Index under Fees "Special Fees".)

399. (0) *Work Placement III.*—Approved and supervised technical work experience in the food and agriculture sector for a minimum of 3½ months. (Normally completed during the summer preceding Fourth Year Agricultural Sciences.) Technical report required. Restricted to students meeting the requirements of the Faculty of Agricultural Sciences and the Co-operative Education Program.

410. (1½) *Issues and Problems in Food Production Systems*—Lectures, seminars and projects focusing on the scientific, technological, demographic, socio-economic and ecological factors influencing the effectiveness of designed food production systems. [0-0-0; 2-2-0]

Anaesthesiology (Faculty of Medicine)

450. *Introduction to Anaesthesiology.*—Introductory lectures on assessment of the patient, conduct of general and regional anaesthesia and their complications and management.

700. *Anaesthesia Clinical Conference*—Presentation of clinical problems by residents and staff with example case presentations and reviews of the literature involving clinical and pathophysiological implications, management and prevention. One hour weekly.

701. *Anaesthesia Intensive Care Unit Conference*— Presentation of cases in the Unit with discussions of their manifestations, diagnosis, pathophysiology, and management, with particular emphasis on respiratory, cardiovascular fluid, electrolyte and drug overdose problems. One hour weekly.

702. *Anaesthesia Basic Science-Clinical Didactic Lecture Series*—Weekly 1½ hour lectures are presented by an anaesthesiologist or staff from an applicable related discipline within the Faculty of Medicine to the anaesthetic residents, clinical clerks, and students. Audio-visual aids are utilized where indicated as are demonstrable materials, techniques, and anaesthetic monitoring equipment. This course is divided into two tutorial groups — a junior (1st year residents and medical student internes) and a senior (2nd, 3rd and 4th year residents).

703. *Anaesthesia Introductory Course on Physics*—A 10-week, 1½ hour per week lecture series on applied physics for anaesthesia, given by anaesthetic staff men. Emphasis is on anaesthetic equipment used in the operating room with a firm basic science approach exemplifying basic principles involved.

704. *Anaesthesia Seminars*—A series of seminars in anaesthesia and related pertinent subjects, given in a 1-year period, for graduate students proceeding to certification or fellowship of

the Royal College of Physicians and Surgeons of Canada. Clinical clerks and students invited. One and one half hours weekly.

705. *Journal Tutorials*—One 2-hour evening session every two weeks, in which selected journal articles are presented by residents and discussed. Directed by Faculty.

706. *Clinical Anaesthetic Investigation*—A clinical anaesthetic fellowship year (full time) associated with the clinical anaesthetic laboratory. A year of clinical study, designed to familiarize the postgraduate resident in anaesthesia with special monitoring equipment and methodology of research. Specific projects are undertaken.

707. *Clinical Anaesthetic Investigation*—A full time research fellowship year in association with the Hyperbaric Oxygen Unit. Arranged in conjunction with the Department of Surgery. Opportunity for clinical and experimental investigation. Surgical and anaesthetic staff supervised.

708. *Clinical Investigation-Respiratory Function*—A full time clinical fellowship year in respiratory function laboratory at St. Paul's Hospital. Supervised by the Director of the Laboratory.

709. *Anaesthesia Basic Science Research and Teaching Fellowship Year in Pharmacology and Physiology*—A full time year at UBC on Campus for senior postgraduate Residents in Anaesthesia, which provides opportunity for anaesthetic research in the central nervous system and cardiovascular system. Teaching and laboratory demonstration obligations in the Departments of Physiology and Pharmacology. Basic science and anaesthetic faculty supervised.

710. *Clinical Anaesthesia*—Practical application of anaesthesia in the operating room with discussion of techniques, applied basic sciences, complications, and their management and prevention.

711. *Internal Medicine for Anaesthesia*—A one year general rotation with emphasis and orientation toward aspects pertaining to anaesthesia.

Anatomy (Faculty of Medicine)

390. (2) *Basic Human Anatomy*.—A lecture course presenting a general account of the structure of the human body by systems. Will include gross and microscopic anatomy. Prerequisites: Biology 101 or 102 or equivalent or current registration in these courses.

392. (2) *Gross Anatomy of the Limbs and Trunk*.—Lectures and laboratory sessions on the human gross and functional anatomy of the limbs and trunk. The course includes the study of predissected specimens. For credit only in the School of Rehabilitation Medicine.

400, 401. *Human Anatomy*.—A correlated course of study for medical and dental students of the structure of the human body including gross, microscopic and radiological anatomy and embryology. Clinics are held in cooperation with the Departments of Medicine, Surgery and Family Practice. Both terms.

405. (1½) *Physiology and Biophysics of Animal Cells*.—A Lecture course based on the molecular organization of cell components and dealing with the interpretation of selected functions of animal cells in terms of current theories. Prerequisites: Chemistry 205, or equivalent, one of Biology 330, Physiology 301, or Zoology 303. Biochemistry 300 or equivalent and Mathematics 200 recommended. [2-0; 2-0]

425. *Elements of Neuroanatomy*.—An introduction to the structure of the human nervous system. First term. Given only in conjunction with Physiology 425. (Open to Medical and Dental students only)

451. (1½) *Clinical and Applied Anatomy*.—Lectures, seminars and laboratory sessions which will focus on clinically relevant regional, histological and embryological material. This course is designed as a basic science elective for Third Year medical students. Departmental approval required.

500. (6) *Gross Human Anatomy*.—An advanced laboratory course in the structure of the human body.

501. (3) *Microscopic Human Anatomy*.—An advanced lecture and laboratory course in the microscopic structure of the human body.

502. (4) *Microscopic Anatomy*.—The microscopic anatomy of tissues and organs in man. Prerequisite: Anatomy 401 or equivalent.

504. (1) *Seminars in Ultrastructure*.

505. (3) *General Cytological Biophysics*.—An examination of selected properties of the cell and underlying mechanisms based on the ultrastructure of the cell and on the physical chemistry of open systems.

509. (2) *Biophysics of Cell Membranes*.—A comprehensive study of transport, electrical and regulatory properties of biological membranes. Prerequisite: Anatomy 405 or equivalent. Biochemistry 508 recommended.

510. (2) *Neuroanatomy*.—The gross and microscopic study of the nervous system in man.

511. (3) *Neuroanatomy*.—Selected advanced topics.

527. (1½) *Muscle Biophysics*.—A lecture and seminar course dealing with selected topics in muscle contraction at an advanced level. Prerequisite: ANAT 405 or equivalent. MATH 315 and 316 strongly recommended. (Same as PHYL 530). [0-0; 2-1]

548. (1-3)c *Directed Studies in Anatomy*.

549. (6) *M.Sc. Thesis*.

550. (0) *Current Topics in the Morphological Sciences*.—Lectures, demonstrations and discussions on selected and current topics in the anatomical sciences. Attendance is required of all M.Sc. and Ph.D. students in Anatomy.

649. *Ph.D. Thesis*.

903. *Surgical Anatomy*.—A review course in human anatomy as applied to surgery.

Animal Science (Faculty of Agricultural Sciences)

258. (1½) *Introduction to Animal Production Systems*.—The livestock and poultry industry; application of scientific principles to the production of various classes of livestock and poultry. [3-2; 0-0]

307. (1½) *Experimental Embryology I*.—Avian embryonic development, structure-function interrelationships and laboratory techniques. [2-3; 0-0]

308. (1½) *Experimental Embryology II*.—Factors controlling cellular differentiation in embryonic systems, enzyme induction and the role of hormones in development. [0-0; 2-3]

310. (1½) *Avian and Mammalian Metabolism*.—A study of metabolic pathways with reference to dietary energy, protein, vitamins and minerals. Influence of specific nutrients as co-factors in the synthesis of body tissues. Emphasis will be placed on domestic and game birds and mammals. [3-0; 0-0]

313. (1½) *Principles of Animal Breeding*.—Qualitative and quantitative genetic principles applied to animal improvement programs. Study and application of mating systems, evaluation procedures and selection programs for domestic species. Prerequisite: Agricultural Sciences 213. [3-0; 0-0]

316. (1½) *Equine Biology, Health and Nutrition*.— Physiology, growth and reproduction of the horse; nutrition, diet formulation and feeding practices; common diseases, their prevention and treatment. Permission of instructor. [0-0; 3-0]

320. (3) *Animal Physiology*.—The functions of muscle, circulation, nerves, digestion and metabolism; respiration, excretion, reproduction and the endocrines of domestic animals. Physiological implications concerned with animal growth, development and lactation. [3-2; 3-2]

321. (1½) *Analytical Methods in Animal Nutrition*.—Principles of chemical analyses in relation to assessment of the nutritive value of feedstuffs and aspects of nutrition relating to the feeding of ruminants. Prerequisite: Animal Science 322. [0-0; 2-4]

322. (1½) *Fundamentals of Animal Nutrition*.—Essential nutrients and their functions; nutrient relationships and animal requirements in growth, maintenance, production and reproduction. Energetics in growth and production. Prerequisite: Chemistry 230. [3-0; 0-0]

323. (1½) *Experimental Nutrition*.—A laboratory course designed to illustrate principles of nutrition and to provide experience in the use of different species in nutritional studies. Prerequisite: Animal Science 321 (this can be taken concurrently) and Animal Science 322. [0-0; 2-3]

324. (1½) *Experimental Nutrition*.—A laboratory course designed to illustrate principles of nutrition and to provide experience with biological assay techniques using different laboratory species. Prerequisite: Animal Science 322. (Permission of instructor required.) [0-0; 1-3]

402. (1½) *Applied Tissue Culture*.—Animal cell and tissue culture and its application to research in nutrition, genetics, physiology and pathology. Prerequisite: recommend Microbiology 200. [2-2; 0-0]

404. (1½) *Poultry Management*.—Systems of poultry management with emphasis on the relationship of environmental factors to efficiency of production. (Offered in alternate years.) [0-0; 2-2]

406. (1½) *Physiology of Reproduction*.—Physiological mechanisms related to reproduction, breeding efficiencies, fertility and milk secretion. [0-0; 2-2]

411. (1½) *Feed Management Systems for Avian Species*.—Physiology of digestion, review of nutritional requirements, composition and classification of feedstuffs, nutritional interactions and other factors influencing diet formulation and design of feed management systems for gallinaceous birds. [0-0; 3-2]

412. (1½) *Fish Nutrition*.—Physiology of digestion and excretion, nutrient requirements, sources of nutrients, diet formulation, feeding management. Prerequisite: Chemistry 230. [0-0; 3-0]

413. (1½) *Advanced Animal Breeding*.—Population dynamics under directional selection, biometrical genetics, estimation of genetic parameters and the theory of selection indices. Prerequisite: Animal Science 313. Offered in alternate years. [0-0; 2-2]

414. (1½) *Animal Breeding Applied to Natural Populations*.—Population and quantitative genetic principles related to the dynamics of natural animal populations. Use of polymorphic and polygenic markers in estimating inbreeding levels, tolerance and rates in wild species. Effects of natural selection and inbreeding on population stability. Prerequisite: Agricultural Sciences 213 or equivalent. Offered in alternate years. [0-0; 2-2]

415. (1½) *Avian Diseases*.—Anatomy and physiology of the fowl; common ailments of poultry and their treatment; autopsies; inspection of farms. Prerequisite: Microbiology 200. [0-0; 2-2]

416. (3) *Advanced Genetics in Agriculture*.—Current genetical concepts and their application in Agriculture. Prerequisite: Agricultural Sciences 213, or a course of similar content and the consent of the instructor. [2-2; 2-2]

417. (1½) *Fundamentals of Pathology and Disease Prevention*.—Basic pathological changes associated with mammalian and avian diseases, body defense mechanisms, principles of epidemiology and introduction to parasitology. Prerequisites: Microbiology 200 and Animal Science 320 or permission of the instructor. [3-3; 0-0]

419. (1½) *Avian Physiology*.—Growth and reproduction, response to environmental factors, recent advances in endocrinology related to poultry. [0-0; 2-2]

420. (1½) *Animal Metabolism*.—A study of intermediary metabolism in domestic animals; the use of radioactive isotopes and other modern techniques in the study of metabolic processes in animals; in vitro rumen fermentation procedures; metabolic features of ruminant tissues. [2-4; 0-0]

421. (1½) *Productivity of Grazing Animals*.—Principles and techniques of the study of energy

flow and productivity in managed and natural grazing systems. Prerequisites: Animal Science 322 and Plant Science 304. (Not offered every year.) [0-0; 2-2]

423. (1) *Seminar.*

424. (1½) *Behaviour of Ungulates.*—An introduction to the social behaviour, social organization and behavioural ecology of domestic and wild ungulates. Applied aspects of behaviour in livestock production and wildlife management are also covered. Recommended: Zoology 323 or Psychology 306. [2-2; 0-0]

426. (1½) *Analyses of Animal Breeding Experiments.*—Computer programming techniques useful for screening, manipulating and storing large data sets. Evaluation and use of available computer software for analyses of various types of animal breeding experiments. Prequisite: Animal Science 413, Plant Science 322 and Computer Science 101. [1-0-1; 1-0-1]

427. (1½) *Diseases of Animals.*—Common diseases of livestock and selected species of wild animals. Epidemiology, zoonotic potential. Disease prevention, with emphasis on the importance of proper management procedures in dealing with specific diseases. Prequisite: Animal Science 417. [0-0; 3-3]

430. (1-3)**c** *Directed Studies.*—On an approved problem.

440. (1½) *Beef Cattle Production.*—Application of biological principles to the breeding, feeding and management of beef animals under extensive and intensive conditions. Students from outside the department require permission of the Head of Department. [3-2; 0-0]

450. (1½) *Swine Production.*—Application of biological principles to the breeding, feeding and management of swine. Students from outside the department require permission of the Head of Department. [3-2; 0-0]

460. (1½) *Dairy Cattle Production.*—Application of biological principles to the breeding, feeding and management of dairy animals under extensive and intensive conditions. Students from outside the department require permission of the Head of Department. [0-0; 3-2]

470. (1½) *Sheep Production.*—Application of biological principles to the breeding, feeding and management of sheep under extensive and intensive conditions. Students from outside the department require permission of the Head of the Department. [0-0; 3-2]

498. (1½) *Undergraduate Essay.*—Preparation of a comprehensive and analytical review of an approved topic under the supervision of a faculty member. Prerequisite: Approval of the Head of Department. Consult before the end of classes in third year.

499. (3) *Undergraduate Thesis.*—Design and execution of an experimental/analytical research project leading to preparation of a thesis. Prerequisite: Approval of the Head of Department. Consult before the end of classes in third year.

500. (1-3)**c** *Graduate Seminar.*—Participation in this course is compulsory. See Graduate Studies section for details.

505. (1½-3)**c** *Reproductive Patterns in Domestic Animals.*—Seminar discussions of selected topics on advanced studies in reproductive physiology. (Offered in alternate years.)

506. (1½) *Advances in Poultry Development and Physiology.*—Recent advances contributing to the understanding of embryonic development; the role of hormones in macromolecular syntheses, hormone production, effect of teratogenic compounds and mechanism of action, nutrient requirements and metabolic changes occurring during development. (Offered in alternate years.) [2-3; 0-0]

513. (3) *Quantitative Genetics.*—Concepts and recent research in quantitative inheritance, behavioural and evolutionary genetics. (Offered in alternate years.) [3-0; 3-0]

514. (3) *Applications of Quantitative Genetics.*— Population genetics, polygenic systems and selection theory as applied to animal populations. (Offered in alternate years.) [3-0; 3-0]

518. (1½) *Environmental Physiology of Domestic Animals.*—The influence of environmental factors on growth and reproduction. (Not offered every year.)

519. *(1½) Mineral Metabolism and Utilization in Domestic Animals.*—Requirements, metabolism and toxicology of macro and micro minerals. Credit will not be given for both Animal Science 519 and Human Nutrition 517. (Not offered every year.)

520. (1½) *Nutritional Physiology of Domestic Animals.*—Current topics in the study of nutrient metabolism in domestic animals; metabolic disorders. (Not offered every year.)

521. (1½) *Animal Energetics.*—Bioenergetics and growth; energy metabolism, utilization and requirements in domestic animals. (Not offered every year.)

522. (1½) *Protein Metabolism and Nutrition in Domestic Animals.*—Recent advances in the metabolism, utilization and requirements of proteins and amino acids in animals. Credit will not be given for both Animal Science 522 and Human Nutrition 511. (Not offered every year).

523. *(1½) Vitamin Metabolism and Utilization in Domestic Animals.*—Requirements, metabolism, toxicology and utilization of vitamins in domestic animals. Credit will not be given for both Animal Science 523 and Human Nutrition 515. (Not offered every year).

524. (1½) *Advances in Poultry Nutrition III.*—Physiological functions of minerals during growth, maintenance and reproduction. (Offered in alternate years.) [0-0; 2-3]

525. (3) *Comparative Nutrition.*—Nutritional requirements and sources of nutrients for aquatic and terrestrial species. Comparative physiology of digestion and excretion. Ecological significance of the diversity of nutritional requirements and sources of nutrients for animals of different levels of organization from protozoa to mammalia. Lectures and seminars. [2-0; 2-0]

526. (1½) *Advances in Poultry Nutrition I.*—The function of fat-soluble vitamins. (Offered in alternate years.) [0-0; 2-3]

527. (1½) *Advances in Poultry Nutrition II.*—Protein nutrition; concepts of amino acid balance; methods of evaluating protein quality. (Offered in alternate years.) [0-0; 2-3]

530. (1-3)**c** *Directed Studies.*

533. (1½) *Wildlife Behaviour and Evolution.*—Seminars and discussion groups with lectures directed towards the synthesis of behaviour, evolution and ecology of wildlife species and domestic livestock on rangelands. [0-0; 2-0]

549. (6) *Master's Thesis.*

649. *Ph.D. Thesis.*

Anthropology (Faculty of Arts)

(Note: For admission requirements for Third and Fourth Year courses, see Anthropology entry under Arts)

100. (3) *Understanding Culture and Society.*—Sociological and anthropological perspectives on modern and traditional societies. Topics may include human origins, cultural diversity, language and communication, technology, inequality, conflict and change. Same course as Sociology 100. [3-0; 3-0]

200. (3) *Introduction to Anthropology.*—Basic concepts and methods of anthropology: human origins and the development of culture; comparative study of social systems, language, religion, art, and other institutions. Examples are drawn from a variety of cultures. [3-0; 3-0]

201. (1½/3)**d** *Ethnic Relations.*—An introduction to the study of the relations between ethnic groups and of the interplay between ethnicity and other social factors. The course will examine such concepts as: ethnicity, racism, prejudice, discrimination, assimilation, and multiculturalism. Ordinarily the course will deal with ethnic groups in British Columbia, and students will be expected to carry out elementary research projects. [3-0] or [3-0; 3-0]

202. (1½/3)**d** *Contemporary Social Problem in Africa, Latin America, or Asia.*—Cultural background to contemporary events; problems of nationalism and tribalism, economic and social development, religion and revolution. The area will ordinarily change each year. [3-0] or [3-0; 3-0]

203. (1½) *Introduction to Anthropological Archaeology.*—An introductory survey of world prehistory, from the emergence of humankind to the beginning of civilizations, set in a framework of the principles of anthropological archaeology and cultural-historical research. [3-0]

204. (1½) *Introduction to Classical Archaeology.*—See Classical Studies 204.

205. (1½) *Introduction to Historical Archaeology.*—An introduction to the study of medieval and modern culture, with special emphasis on Canada, using archaeological evidence to illustrate the principles, aims and techniques of historical archaeology and related disciplines. (Also listed as History 205) [3-0; 0-0]

206. (3) *Introduction to Southeast Asia.*—See Asian Studies 206.

213. (1½/3)**d** *Women in Comparative Perspective.*—(Same course as Sociology 213.) An exploration of topics from Anthropology and/or Sociology focussing on explanations, in current and historical perspective, for variations in the situation of women. [3-0] or [3-0; 3-0]

214. (1½/3)**d** *The Family in Cross-Cultural Perspective.*—A cross-cultural comparison of family and kinship to provide an understanding of variations in the structure and meaning of marriage relations, forms of domestic organization, the sexual division of labour, property, and inheritance. (Same course as Sociology 214.) [3-0] or [3-0; 3-0].

217. (1½) *Culture and Communication.*—The study of communication; the relation between communication and its cultural context with emphasis on language, folklore, myth, ritual, and their social expression. [3-0]

220. (1½) *Indians of British Columbia: Cultures and Resources.*—A study of traditional lands and cultures. [3-0]

221. (1½) *Indians of British Columbia: Art and Myth.*—Traditional arts and myths, using the collections of the Museum of Anthropology. [3-0]

240. (1½) *Introduction to the Study of Human Evolution.*—This will introduce a macro-evolutionary view of development of the genus Homo, examining fossil series of hominids with emphasis on the pre-Pleistocene precursors of the genus, and the morphology and behaviour of other primates. A neo-Darwinian, evolutionary perspective will be stressed. Not open to students in the Life Sciences in the Faculty of Science. [3-0]

300. (3/6)**d** *Course and Seminar in Social Organization.*—The study of selected areas and communities drawn from around the world with an emphasis on problems of cross-cultural comparison and on theoretical issues of current importance in the discipline. For majors only. [3-0; 3-0 or 6-0; 6-0]

301. (1½) *Contemporary Indians of British Columbia.*—An examination of the relations between Indian and non-Indian cultures, with special reference to current Indian situations and their anthropological background. [3-0]

302. (1½/3)**d** *Ethnography of South Asia.*—A specialized study of ethnographic and theoretical problems relating to South Asia. [3-0] or [3-0; 3-0]

303. (1½/3)**d** *Ethnography of Special Areas.*—A specialized study of ethnographic and theoretical problems in one area. Different culture areas or regions may be selected each term. Students should consult the Department for this year's offerings. [3-0] or [3-0; 3-0]

304. (3) *Ethnography of the Northwest Coast.*—Specialized study of ethnographic and theoretical problems of the region. [3-0; 3-0]

305. (3) *Theory in Archaeology.*—Explores models of culture change and culture used by prehistorians, with the emphasis on formulation of research designs in order to work on specific problems in culture history, settlement, ecology, evolution, and technological change. The course views archaeological theory in relation to anthropological theory in general. [3-0; 3-0]

306. (3) *Summer Field Training in Archaeology.*—Intensive training in excavation techniques, and interpretation, including mapping procedures, recording, preliminary analysis, and reporting. Students will participate in an excavation for the summer session and will use this excavation as a basis for lectures, discussions, and reports. [3-3]

310. (1½/3)**d** *Urban Anthropology.*—Structure, organization, and development of non-west-

ern urban areas in their own context and in cross-cultural perspective. Fieldwork data collection in such settings. Evolution of non-western cities, urban process in relation to economic development; tradition and change in urban social organization; patterns of urban growth; problems of rapid urbanization; stratification, mobility and urban development, political process and change in urban development. [3-0] or [3-0; 3-0]

316. (1½/3)**d** *Political Anthropology*.—Comparative study of primitive and tribal political organization; leadership and non-centralized and centralized political systems. [3-0] or [3-0; 3-0]

318. (1½) *Statistical Methods I*.—Organizing, displaying and summarizing data. Inductive inference based on elementary probability models including estimation and hypothesis testing. This course, taught by the Department of Statistics, is identical with Statistics 203. As Anthropology 318, it is open only to major students in Anthropology. Prerequisite: Mathematics 11. Same course as Sociology 318. [3-0; 0-0]

320. (3) *Prehistory of the Old World*.—Detailed examination of the pre-history of Europe, Africa, the Near East, and Asia from early hominid communities through the beginnings of settled farming communities to the rise of urban centres. [3-0; 3-0]

321. (1½) *The Canadian Far West in Prehistory*.—A survey of prehistoric archaeology west of the Rocky Mountains. Reconstruction of prehistoric cultural developments from the earliest migrations up to historical contact. Not available for credit in the Major and Honours program. [3-0]

322. (1½) *Archaeological Foundations of East and Southeast Asian Civilizations*.—Survey of the archaeology of East and Southeast Asia, with an emphasis on the beginnings of the economic, social, political, and artistic traditions and systems of the great civilizations, and the conditions in which they arose. Theories of cultural development emphasizing Neolithic and state-level societies will be discussed. [3-0]

325. (3) *Introduction to Physical Anthropology*.—Origin and development of the hominids. Interaction between culture and hominid biology. Comparative primate anatomy of the Pleistocene fossil record. Anthropometric techniques for describing fossil and living populations. Topics in human genetics, especially population genetics. [3-0; 3-0]

329. (3) *Native Peoples of Canada*.—Survey of Canadian Indian and Inuit cultures and the history of their colonization and integration. Reference may be made to such topics as administrative policies, research and development programs, and emergent native movements. [3-0; 3-0]

330. (3) *Peasants and the Third World*.—A comparative study of peasant society; relation of peasants to the national policy; social and cultural inhibition of development programs; the cultural bases of revolutionary action in the Third World. [3-0; 3-0]

331. (3) *Anthropology of Art*.—Anthropological perspectives on artifacts and symbolic forms: their production, use and function in relation to technology, ecology, social organization and cognitive structures. [3-0; 3-0]

332. (3) *The Analysis of Myth*.—Relationships between myth and social structure; comparative study of myth; formal structures of myth. [3-0; 3-0]

341. (1½/3)**d** *Material Culture of Selected Areas*.— Society in relation to its material furnishings, arts and crafts including both traditional and contemporary forms, based upon the slide and artifact collections in the Museum of Anthropology. Particular cultures or regions will be emphasized each term. [3-0] or [3-0; 3-0]

351. (1½) *Ethnography of the Pacific Islands*.—Major cultural groupings in Polynesia, Melanesia, and Micronesia, emphasizing both traditional cultures and the incorporation of the region into modern international institutions. [3-0]

352. (1½) *Ethnography of East Asia*.—Major cultural groupings and traditions of China, Japan, and Korea. [3-0]

353. (1½) *Ethnography of Latin America*.—Indigenous peoples of Latin America, emphasizing both pre-Columbian cultural traditions and socio-economic and cultural changes from the Colonial period to the present. [3-0]

400. (1½/3)**d** *History of Anthropology*.—The development of the major approaches in anthropology in their institutional contexts. [3-0] or [3-0; 3-0]

401. (3) *Indians of North America*.—Native cultures of the United States and Canada; linguistic and cultural relationships; the culture of reserves and the reserve systems in both countries. [3-0; 3-0]

402. (1½/3)**d** *Ethnography of China*.—Advanced studies in the ethnography of China, premodern and contemporary. Topics may include kinship, rural and urban social structure, stratification and mobility, religion, national power structures, and social change in Chinese society. [3-0] or [3-0; 3-0]

403-5. (1½/3)**d** *Ethnography of Special Areas*.—An advanced study of ethnographic and theoretical problems. A different region may be studied each term. [3-0] or [3-0; 3-0]

406. (1½/3)**d** *Analytical Techniques in Archaeology*.—A survey of methods and techniques in the interpretation of archaeological data; practical experience in processing and analyzing archaeological materials by means of a research project. Students will prepare manuscripts, drawings and photographs for publication, and will learn the basics of lithic and faunal analyses. Prerequisite: Anthropology 305 or permission of the Instructor. [3-0] or [3-0; 3-0]

407. (1½) *Principles of Field Work*.—An examination of field work as the basic setting for ethnographic research. Survey of field techniques and research design; the assessment of evidence for ethnographic conclusions. [3-0]

408. (1½) *Field Methods*.—Intensive examination and application of selected methods of ethnographic data-collection, e.g., anthropological interviewing, genealogies, ethnographic semantics, life histories, oral traditions. Prerequisite: Anthropology 407. [3-0]

410. (1½/3)**d** *Prehistory of a Special Area*.—Detailed analysis of the prehistory of a given area, including an exhaustive summary of the literature and the discussion of the relevant problems in order to prepare the student for future work. The course will provide background for students in area studies such as North America, Oceania and the Far East. [3-0] or [3-0; 3-0]

413. (1½/3)**d** *Family and Kinship*—A cross-cultural survey of ways of defining family relationships and kinship organizations, including theoretical analysis as well as case studies. [3-0] or [3-0; 3-0]

414. (1½/3)**d** *Economic Anthropology*.—Comparative analysis of primitive and tribal systems of production and distribution; relationships between economic and social systems, particularly in the context of modernization. [3-0] or [3-0; 3-0]

415. (1½/3)**d** *Religion and Society*.—Comparative study of religious beliefs and practices; relations between religious, social and political institutions; religion as a force for stability and change; anthropological theories of religion. [3-0] or [3-0; 3-0]

417. (1½/3)**d** *Language and Culture*.—The relationships between linguistic and cultural phenomena; how language affects normative and cognitive systems of thought and behavior. [3-0] or [3-0; 3-0]

418. (1½/3)**d** *Social Statistics*.—Primary emphasis on applications of statistical techniques to quantitative and qualitative data in both Anthropology and Sociology. Prerequisite: Anthropology 318 or Sociology 318, or permission of instructor. Same course as Sociology 418. [3-0] or [3-0; 3-0]

420. (1½/3)**d** *Archaeology of British Columbia*.—An advanced study of the prehistoric archaeology of coastal and interior Indians. A critical analysis of the archaeological evidence and interpretations of prehistoric cultural developments from the earliest migrations up to historical contact. Prerequisite: Anthropology 305 or permission of instructor. [3-0] or [3-0; 3-0]

424. (1½/3)**d** *Applied Archaeology*.—A review of the history and current practices of cultural heritage resource management. Includes legislative background and governmental organization as well as current practices in resource assessment and in salvage archaeology. The relationships between government, consultant, sponsor and Indian bands are explored with emphasis on recent developments. [3-0] or [3-0; 3-0]

425. (1½/3)**d** *Behavior and Social Relations in Non-Human Primates*.—Survey of the order Primates, exclusive of humans, with regard to ecology, behavior, and social organization. Particular attention will be given the Superfamilies Cercopithecoidea (Old World monkeys) and Hominoidea (great apes). Prerequisite: Anthropology 325. [3-0] or [3-0; 3-0]

430. (3) *Theory and Programs of Social Change*.—General theory of cultural evolution and social change. Changes among tribal and folk programs of welfare and development. [3-0; 3-0]

431. (3) *Museum Principles and Methods*.—Training in museum operation utilizing the facilities of the Museum of Anthropology. Theoretical issues discussed in combination with laboratory projects. Special attention paid to the care, cataloguing, and use of collections, and to the evaluation of museum programs. For fourth-year and graduate students. [2-3; 2-3]

433. (1½/3)**d** *Directed Studies*.—General reading and/or a research undertaking, with the agreement, and under the supervision, of a faculty member in the department selected by the students. No more than 3 units of Directed Studies may be taken for credit toward the major or honours degree.

449. (3/6)**d** *Honours Tutorial*.—Will usually require the presentation of at least one research paper.

450. (1½/3)**d** *Formal Anthropological Theories*.—The logic underlying anthropological theory; methods and assumptions required for describing a theory formally and deducing consequences. Applications and examples from anthropology and related fields. [3-0] or [3-0; 3-0]

451. (1½/3)**d** *Conservation of Organic Materials*.—Principles and elementary techniques for conserving organic ethnological and archaeological materials. Recommended for students intending to work with cultural materials. Open to majors; other students by permission of the instructor. [3-2]

452. (1½) *Conservation of Inorganic Materials*.—Principles and elementary techniques for conserving inorganic ethnological and archaeological materials. Recommended for students intending to work with cultural materials. Open to majors; other students by permission of instructor. [3-2]

460. (1½/3)**d** *Cultural Ecology and Cultural Evolution*.—Social organization in the context of the theoretical approaches of cultural evolution and cultural ecology with particular emphasis upon primitive societies: kinship, political organization, warfare, economic organization, peasant societies, religious movements, underdevelopment, and social change. [3-0] or [3-0; 3-0]

470. (1½/3)**d** *Structural Theory in Anthropology*.—Principles of structural analysis of social action; historical development of structural points of view; examination of current structural theories. [3-0] or [3-0; 3-0]

495. (1½/3)**d** *Advanced Studies in Anthropology*.—An intensive examination of selected topics in Anthropology. The department should be contacted regarding areas for study in a given year. [3-0] or [3-0; 3-0]

500. (3) *History of Anthropological Thought*.—This course will consider various approaches to anthropology, from classical to contemporary.

501. (1-3)**d** *Social Structure and Kinship*.

502. (1-3)**d** *Advanced Ethnography of a Special Area*.

505. (1-3)**d** *Religion and Society*.

510. (1½/3)**c** *Comparative and Developmental Studies in Archaeology*.

511. (1-3)**d** *Personality and Culture*.

512. (1-3)**d** *Language and Culture*.

515. (1-3)**d** *Cultural Evolution and Cultural Ecology*.

516. (1½) *Qualitative Methods in Anthropology*.—A discussion of selected methods used to observe, describe, and interpret cultural phenomena and social organization. The course will consider such techniques as participant observation, interviewing, ethnographic

semantics, life histories, componential analysis, and photography. Attention will also be given to ethics in anthropological research and writing, and to such analytic matters as the nature of description, conceptualization, generalization, and content analysis. [3-0; 0-0]

517. (1½) *Archaeological Methods.*—A discussion of selected basic data-gathering methods in their relation to the development of ideas about the archaeological record. [3-0]

520. (1-3)**c** *Advanced Prehistory of a Special Area.*

525. (3) *Semantic Analysis of Myth.*

527. (1½) *Advanced Archaeological Methods.*—An intensive review of analytical approaches to the study of archaeological data and their applications. Includes research design, sampling strategies, analytical lab procedures, classification and typology, multivariate analysis and other statistical procedures. Prerequisite: Anthropology 517.

528. (1½) *Advanced Quantitative Methods.*—The purpose of this course is to introduce students to the anthropological application of a variety of quantitative techniques. Specifically there will be sections on sampling designs, analysis of variance and regression, multi-way contingency tables, and multivariate analysis. Topics will be presented initially in a series of lectures which will outline the logic and exhibit applications which have been made. Students will then be expected to generate their own application and make a presentation. Access to data files specific to the substantive field — cultural anthropology, archaeology, physical anthropology — will be provided. Prerequisite: Anthropology 418.

530. (1-3)**d** *Social Change.*

531. (1-3)**d** *The Anthropology of Development.*

532. (1-3)**d** *Field Methods.*

534. (1-3)**d** *Special Advanced Courses.*

540. (1-3)**d** *Advanced Seminar.*

541. (1-3)**d** *Advanced Seminar and Workshop on Museum Studies.*—Prerequisite: Anthropology 431.

545. (1-3)**d** *Graduate Research Seminar.*

549. (3/6)**c** *Master's Thesis.*

649. *Ph.D. Thesis.*

Applied Science (Faculty of Applied Science)

110. (0) *Work Placement I.*—Supervised, technical work experience in an established company or organization for a minimum of 3½ months during First Year Applied Science. Technical report. Restricted to students meeting the requirements of the Faculty of Applied Science and the Co-operative Engineering Education Program.

120. (0) *Introduction to Engineering.*—Non-credit course designed to introduce students to Engineering. Information on the Faculty, the Profession and the particular skills and type of work conducted by practising Engineers in different disciplines. [1-0-0; 0-0-0]

150. (1½) *Resources and Engineering.*—Origins, occurrences, processing and uses of renewable and nonrenewable resources and the role of engineering design in their conversion to useful forms. [3-0-0]

151. (1½) *Engineering Graphics.*—Orthographic projection, technical sketching, engineering geometry, standards and conventions of graphic language; graphic solution of space problems; presentation of engineering data. Development of the ability to visualize in three dimensions. [1-0-4; 0-0-0] or [0-0-0; 1-0-4]

210. (0) *Work Placement II.*—Supervised, technical work experience in an established company or organization for a minimum of 3½ months during Second Year Applied Science. Technical Report. Restricted to students meeting the requirements of the Faculty of Applied Science and the Co-operative Engineering Education Program.

260. (3) *Technology and Society.*—The course deals with the influence of technology on the social, political, economic, and environmental aspects of society. The areas of emphasis vary from year to year. Subjects considered have included energy, the industrial revolution, the green revolution, third world development, limits to growth, politics and values, and pollution. [2-0-2; 2-0-2]

278. (1½) *Engineering Materials.*—Atomic bonding; crystal structures and imperfections; properties of metals, ceramics, polymers, wood, concrete and fibre composite materials; selection of materials; corrosion; mechanical testing and heat treatment [3-2*-0; 0-0-0]

310. (0) *Work Placement III.*—Supervised, technical work experience in an established company or organization for a minimum of 3½ months during Third Year Applied Science. Technical Report. Restricted to students meeting the requirements of the Faculty of Applied Science and the Co-operative Engineering Education Program.

380. (1½) *Introduction to Microcomputers.*—An introductory course intended for potential users of microcomputers in real time or non-computational engineering applications. Topics include: perspective on applications and costs; basic microcomputer hardware; principles of microcomputer operation; introduction to microcomputer programming and software design tools; input-output devices including transducers, analog-to-digital converters, digital-to-analog converters; input-output methods and interface characteristics; selected case studies such as direct digital controllers and sensor based systems. (Limited enrolment. Restricted to engineering students not taking Electrical Engineering.) [0-0-0; 2-3*-2*] or [2-3*-2*; 0-0-0]

410. (0) *Work Placement IV.*—Supervised, technical work experience in an established company or organization for a minimum of 3½ months during Fourth Year Applied Science. Technical Report. Restricted to students meeting the requirements of the Faculty of Applied Science and the Co-operative Engineering Education Program.

450. (½) *Professional Engineering Practice.*—Legislation affecting the practice of engineering, ethical principles and responsibilities involved; development of contemporary engineering organizations. [1-0-0; 0-0-0]

459. (1½) *Engineering Physics Projects I.*—Experimental work on projects designed to give research, development and design experience in Engineering and Science. Students are normally expected to spend 50% of their laboratory time in collaboration with a faculty member in an engineering department and 50% with a member in science. Students will be expected to give at least one seminar each term about their project. Students should consult the Program Director of Engineering Physics for details. [0-0-0; 0-5-1]

479. (1½) *Engineering Physics Projects II.*—Experimental work on projects designed to give research, development and design experience in Engineering and Science. Prerequisite: APSC 459. [0-5-1; 0-0-0]

550. (1½) *Biomedical Measurements and Biomaterials.*—Biocompatible materials for measurement and therapeutic purposes. Principles and technology of measuring temperature, displacement, motion, force, pressure, flow, ions, dissolved gases and bio-electric potentials in living organisms. [3-3*-0; 0-0-0]

552. (1) *Clinical Engineering Seminar.*—Topics covered will vary somewhat from year to year but include principles of pharmacology, drugs as therapeutic agents, principles of chemotherapy, principles of hospital safety, ultrasonics, optics, legal and managerial aspects of Clinical Engineering, student reports on internship projects. [0-0-2; 0-0-2]

554. (3) *Directed Studies in Clinical Engineering.*—Supervised work on several clinical engineering projects in local hospitals.

556. (1½) *Clinical Engineering Practice.*—Principles of professional clinical engineering practice, functions, organization and operation of hospital-based clinical and biomedical engineering departments.

Archaeology —See Faculty of Arts

Architecture

(School of Architecture, Faculty of Applied Science)

**Additional fees are charged for these courses. See "Special Fees" P. 22.

400. (4½) *Architectural Design IA.*—Studies and exercises using the project method as a means of problem-solving in the area of the man-made environment. Stimulation of creative ability and the development of skills important to the architect. Prerequisite: Architecture 406.

401. (4½) *Architectural Design IB.*—Description as for Arch. 400.

404. (1½) *Architectural History.*—Origins of contemporary architectural thought. A survey of the theories, technologies and social changes which have influenced architecture and related fields of design since the 18th century. Lectures, seminars and student papers. Open to students outside the School. Students may not receive credit for both Arch. 404/405 and Fine Arts 347 or 348.

405. (1½) *Architectural History.*—Origins of contemporary architectural thought. Critical analyses of the contribution of the 20th century masters of architecture, engineering, and industrial design. Lectures, seminars, and student papers. Open to students outside the School. Students may not receive credit for both Arch. 404/405 and Fine Arts 347 or 348.

**406. (1) *Workshop.*—Experiments in specially selected environmental situations. Usually carried out during an extended field trip in order to emphasize a mutual faculty and student 'living and learning' experience. Architects and others in related fields are invited to lead a series of discussions and to participate in various projects. The workshop is usually offered during the last two weeks of August. It is required that students attend the workshop before being admitted to Arch 400 in the Fall. (A fee will be charged to cover expenses.)

407. (1½) *Research Methods for Architects.*—Qualitative and quantitative investigative and evaluative tools and techniques appropriate for designers during various stages of project implementation.

408. (1½) *Social Aspects of Architectural Space.*—Development of design principles and applications of specific social theory in architecture, including N- and P- spaces, overload and span of social control, variety and monotony, privacy and crowding, proxemics, front- and back-stages, defensible space and territoriality, and environmental knowing. Lectures, graphics, student presentations.

409. (1½) *Introduction to the Behavioural Basis of Design.*—A survey of man-environment relations, human factors, social theory and research for architects.

410. (1½) *Workshop: Architectural Graphics.*—Study and explanation of drawing and other graphic media as a means of communication and expression in architecture.

411. (0) *Computer Workshop.*—A non-credit six-hour workshop to introduce architectural students to the computing environment, to comprehend basic operating and logical principles, to become familiar with the Schools computing system, and to appropriate potential applications.

412. (1) *Techniques Workshop.*—Lecture demonstrations and assignments which will assist students in the design tutorials to master skills and techniques relevant to the design process. Topics very according to need.

413. (1½) *Introduction to Issues and Ideas in Architecture.*—Lectures and discussions about issues and ideas in architecture intended to dispel misconceptions about this field, and to provide insights into what it is and the context within which it is realized. First-year students take it concurrently with 400, Arch Design 1A.

416. (1½) *Architecture Structures I.*—Introduction to the "structural problem" through investigation of the inter-relationships between force, geometry and material and their effects on structural elements. Expansion of these effects on individual elements, into the

context of the structure as a system and their relation to the form, safety, economy of the structural system. Development of a quantitative analysis and design of simple beams and qualitative expansion of the ideas into more complex elements. The intent of the course is to allow the student to create a context for the knowledge of and feeling about structures and their role in architecture. Prerequisite: Arch. 426.

417. (1½) *Computer Applications in Architecture 1.*—Instruction in three major topic areas: Computer Graphics (fundamentals, data organization and interactive systems); Project Management (scheduling, resource allocation and cost control); and Space Planning (programming, utilization and design). Computing facility developed in context through hands-on experience and access to program libraries. Prerequisite: Arch. 411.

419. (1½) *Computer Applications 2.*—Individual investigation and development of computer applications to selected topics in architectural practice. Pre-requisite: Arch. 417 or permission of instructor.

420. (4½) *Architectural Design 2A.*—Studies and exercises using the project method as a means of problem-solving in the area of the man-made environment. The stimulation of creative abilities and the further development of skills important to the architect.

421. (4½) *Architectural Design 2B.*—Description as for Arch. 420.

422. (½) *Project Costing.*—This short course provides an overview of how project costs are determined, and how relative costs of various alternative elements, components, or configurations can provide a useful basis for design decisions.

423. (1½) *Process and Practice of Architecture 1.*—An overview of the complex processes by which architecture is realized and the professional role of the architect within them.

424. (1½) *History of Urban Form.*—A survey of the physical forms of cities and their relationship to the cultures with which they are associated. Open to students outside the School.

425. (1½) *Workshop: History of Urban Planning.*—Exploration of 19th and 20th century theories of planning and urban form. The workshop format will allow students to experiment with these ideas in model form. The relevance of these theories and ideas to the form of modern cities will be evaluated. Open to students outside the School (see also School of Community and Regional Planning listing).

426. (1½) *Architectural Technology 1.*—Introduction to architectural technology considering design objectives and requirements for building structures, environmental conditions and enclosure systems. Study of building materials, including properties, applications and performance.

427. (1½) *Architectural Technology 2.*—Primary building elements characteristic of low-rise buildings as well as certain aspects of more complex building technology. Materials and methods of construction will be considered in the context of performance requirements, building regulations, and contract documents.

430. (1½) *Architectural Acoustics.*—This course will review and reinforce basic theory and concepts, including human response to sound. The emphasis of the course will be placed in the control of noise and vibration in buildings and in the achievement of optimum listening conditions for speech and music. Prerequisite: Arch. 452.

431. (1½) *Light, Colour and Space.*—A quantitative examination of light and colour in spatial perception. The tools, techniques and quantities used in lighting design together with their application to specific problems. Lectures, laboratories and seminars. Prerequisite: Arch. 452.

436. (1½) *Architectural Structures 2.*—Utilizing the basic principles established in Arch.Structures 1 develop an operational facility in designing wood frame structures for general loading such as are found in residential construction. Quantitative investigation and comparison of wood, steel and concrete elements and structural systems with emphasis on horizontally spanning elements. Qualitative study of other structural elements such as walls, columns, foundations, etc. Introduction to earthquakes and lateral force for resisting systems. Prerequisite: Arch 416.

440. (4½) *Architectural Design 3A.*—Studies and exercises of a nature related to problems in man-made environment. Such studies and exercises aim at understanding the environment, of human responses to it and the means the architect may use for defining and solving problems.

442. (1½) *Housing and Community.*—Investigations into the inter-relationships between housing and urban form; examination of the relevant theories and their consequences in terms of architecture.

445. (1½) *Current Theories of Architecture.*—Lectures and discussions of current theories of architecture based on reading assignments, papers, presentations by staff, students and visitors. Enrolment may be limited to facilitate discussion.

446. (1½) *Contemporary Issues in Architecture.*—Lectures and discussions of contemporary issues in Architecture based on reading assignments, papers, presentation by staff, students and visitors. Enrolment may be limited to facilitate discussion.

447. (1½) *Urban Design Workshop.*—This course will survey the techniques involved in the process of architectural analysis and design at urban scale. Also included will be studies of design strategies for the implementation of design policies, guidelines and bylaws related to city form, image and aesthetics. Lecture, seminars and student papers. Limited to 15 students.

448. (1½) *History of Theories of Architecture.*—An advanced seminar in architectural history concentrating on detailed study of the literature on selected architectural theories which have had an effect on twentieth century architectural form.

450. (1½) *Design Management.*—Review of factors that are the basis for the change of scale of architectural projects and the greater mechanization of the building industry. Architectural design as resource management and the optimization of design solutions within different contexts are discussed. The design and development process will be reviewed to include significant concepts and approaches which determine the quality of architecture. The topics will include: design methods, energy standards, life-cycle costing, design-build, construction management, and project planning, etc. Prerequisite: Arch. 423.

451. (1½) *Process and Practice of Architecture 2.*—Expansion of the professional role of the architect; management and business aspects of practice. Prerequisite: Arch. 423.

452. (1½) *Environmental Systems and Controls 1.*—Building form and fabric considerations to assure appropriate thermal, luminous, sonic, and atmospheric conditions within buildings.

454. (1½) *Environmental Systems and Controls 2.*—Mechanical and electrical services of buildings and their integration with architectural form and fabric. Prerequisite: Arch. 452.

455. (1½) *Energy and Building Design.*—Lecture course which explores the factors leading to the design of energy efficient buildings. Course covers heat transfer concepts, internal planning, site planning, form implications, fabric implications, predictive techniques. Prerequisite: Arch. 452.

456. (1½) *Structures: Special Topics.*—Discussion of current trends, developments and methods in structures of buildings. Special types such as suspended and pneumatic systems, space frames, etc. and special methods, e.g. use of models in structural design, will be dealt with. Detailed program to vary from year to year. Prerequisite: Arch. 416 or equivalent.

458. (1½) *Architectural Seminar.*—An explanation of selected topics in architecture. Course enrollments will be restricted. Permission of instructor required.

459. (1½) *Directed Studies.*—An exploration of selected topics in Architecture. Available to individual students with the agreement of a member of the faculty available to supervise the work.

460. (4½) *Architectural Design Abroad.*

461. (4½) *Study of Architecture Abroad.* —A pre-arranged program concerned with a particular locality in which a unique quality of architecture and specific architectural problems are to be found. The program will cover fields of study, the contents of which would in ordinary circumstances be advanced by the faculty had they remained in Vancouver. Accordingly, credit for 460 and 461 are together equivalent to one term's work in Vancouver, and credit for 461 will be accepted in lieu of 3 - 1½ credit courses, while credit for 460 will be accepted in lieu of credit for 401, 420, 421 or 440. The problems undertaken in 460 will be project oriented and related to the locale. The course 461 will consist of lectures, seminars, individual research, and field trips. Students electing to participate in the program must be prepared to meet additional expense. This program will be arranged according to academic need within the School and current opportunities for travel. The program is not available to students in their first year.

471. (1½) *Meaning in Architecture.*—Issues pertinent to architectural meaning including: environmental perception, cognition, and evaluation; meaning, communication and signification; cognitive mapping; archetypal place; urban comprehensibility and morphology. The significance of these issues to the design process and the generation of form in the built environment.

472. (1½) *Meaning and Behaviour in the Landscape.*—Selected topics from the literature of other disciplines pertaining to the design and interpretation of the landscape.

474. (1½) *Introduction to Facilities Programming.*—Examination of process employed to discover and define user requirements, evaluate their importance, set limits on alternatives, generate tentative schemata, and involve users in preliminary design. Discussion of space formulae, priorities planning vs. incremental planning, functional programming and research tools and operation. Prerequisite: Arch. 423.

485. (1½) *Special Topics in Architectural Technology.*—Exploration of aspects of architectural technology and advanced techniques in building. Prerequisite: Arch. 426, 427, 452, 416.

498. (1½) *Graduation Design Project: Part 1. Project Report Preparation.*—An in-depth exploration of a social, urban or environmental problem leading to the definition of parameters for an architectural design solution brought to resolution in the form of a major Report as preparation for Arch 499: Part 2. Graduation Design Project.

499. (4½) *Graduation Design Project: Part 2.*—The development and resolution of the design project set out in Arch 498 Graduation Design Project: Part 1. Project Report Preparation, to be carried out under the direction of a Committee of faculty and outside professionals.

500. (1½/3)c *Architecture Seminar*—This course serves mainly as a forum for the exchange of ideas, and will be based on presentation of student papers. The second term will concentrate on the discussion of student research projects.

503. (3) *History of Architectural Theory and Philosophy*—The exploration and analysis of theories and philosophies of architecture and design, and the ways in which they affect architectural form.

504. (1½) *Planning the Residential Environment*—A lecture seminar and workshop course intended to provide the student with an understanding of the principles of physical development of a residential site in the metropolitan area. The following subjects will be considered: site analysis, the process of site planning, qualitative criteria for site planning, housing types and densities, landscape, community facilities and an examination of innovative ideas in site planning. Field trips are made to examine site developments in the metropolitan area.

508. (1½/3)c *Programming for Building Users.*—Examination of processes employed to discover or define user problems, evaluate their importance, set limits on alternatives, generate tentative schemata, and involve users in preliminary design. Discussion of space formulae, priorities planning vs. incremental planning, functional programming and research tools and operations.

**512. (1½/3)c *Urban Design: Advanced Design Projects.*—The study of archetypal spaces, forms and functions of the urbanized environment. Main emphasis will be on specific design projects in both individual and group work involving exercises and application of architectural skills and strategies within the context and scale of urban structure.

513. (1½/3) *History of Housing.*—Segments of the history of housing. Selected according to faculty availability and student interest.

532. (3) *Advanced Building Science*—An advanced course providing detailed study of

scientific techniques applied to the design and appraisal of the built environment. This course brings together several aspects of modern building science including noise control, artificial and natural lighting and crypto-climate control.

547. (3) *Directed Studies*.—Under the direction of the thesis supervisor, the student will focus his research activity and define the thesis for review and acceptance by the Graduate Program Committee.

549. (9) *Research Project and Thesis for the M.A.S.A. Degree*—The research project and thesis will be carried out under the overall guidance of the thesis supervisor, and must be completed to the requirements of the Faculty of Graduate Studies.

Archival Studies

(School of Library, Archival and Information Studies, Faculty of Arts.)

500. (3) *Introduction to Archives and Manuscripts*—The principles, terminology and literature of archival work. Types of materials collected and their characteristics. Acquisitions policy, program, strategy and techniques. Accessioning, sorting and arrangement of archival materials. Compilation of finding aids, inventories, calendars, card catalogues and indexes. Shelving and storage. Service to the public. Exhibits.

510. (1½) *Records Management*.—Principles and terminology of paperwork management and records management. Building, equipment and staff for the records centre. Organization, administration and operations (records classification, storage, transfer, scheduling, disposal, circulation and use) of the records centre.

520. (1½) *Automation and Archives*.—Introduction to the concepts and terminology of automation. Machine based means of storing and manipulating finding aid data. Problems of controlling machine readable materials as a type of archival holding.

530. (1½) *Practicum*.—A practicum will be required of all students. This will involve a minimum of one month in a recognised archival repository under the supervision of an Archivist. Prerequisite: Archival Studies 500.

600. (3) *Advanced Archives and Manuscripts*.—History of archives, archival legislation, professional associations, principles of appraisal, electronic data processing and archives, publications program, public relations, archival buildings and equipment, copyright, archival administration, planning, budgeting, workflow and staffing, relationship to kindred professions (museum or gallery curator, records manager, librarian), special problems of business, church and university archives and the collection of literary manuscripts. Prerequisite: Archival Studies 500.

610. (1½) *Preventive Conservation of Materials*.—Preservation and restoration of historic and artistic works on paper and bindings. Physical properties of materials. Environmental and biological causes of deterioration and methods of combatting them. Conservation techniques (examination, documentation, testing, cleaning, fumigation and mending). Practical experience in basic conservation skills.

614 (1½) *Advanced Seminar*.—Consideration of special topics in the administration or use of archives. Not offered each year; consult the School of Library, Archival and Information Studies.

615. (1½) *Directed Study*.—Individual programs of reading under faculty direction.

620. (6) *Thesis*.—A thesis will be required of all students before the completion of the M.A.S. program.

Art Education—See Faculty of Education.

**Additional fees are charged for these courses. See "Special Fees" P. 22.

**100. (3) *Introduction to the Plastic and Graphic Arts*.—Studio study and experiment in perceptual and conceptual language of art as a basis for advanced work in specialized areas. Students must obtain at least a second class standing in Art Education 100 to be considered for an Art concentration or major. [1-3; 1-3]

201. (3) *Drawing*.—Prerequisite: Art Education 100. [1-3; 1-3]

302. (3) *Painting I*.—Prerequisite: Art Education 100. [1-3; 1-3]

303. (3) *Ceramics and Modelling I*.—Prerequisites: Art Education 100 and 201. [1-3; 1-3]

**305. (3) *Design I*.—Prerequisites: Art Education 100 and 201. [1-3; 1-3]

307. (3) *Graphic Arts I*.—Prerequisites: Art Education 100 and 201. [1-3; 1-3]

321. (3) *Microcomputers in Art and Music Education*.—The application of computers as creative instruments in art and music with emphasis on strategies for integrating art and music activities and on pattern making and pattern manipulation. (Same course as Music Education 321.) [1-4; 1-4]

**323. (1) *Curriculum and Instruction in Art I*. [2-2; or 2-2]

341. (3) *Teaching about the Visual Arts*.—The exploration of ideas, issues, and themes related to the critical and historical aspects of the visual arts. Approaches to the teaching of art history and art criticism. Prerequisite: Fine Arts 100. [3-0; 3-0]

401. (3) *Painting II*.—Prerequisites: Art Education 100 and 302. [1-3; 1-3]

402. (3) *Painting III*.—Prerequisite: Art Education 401. [1-3; 1-3]

403. (3) *Ceramics and Modelling II*.—Prerequisite: Art Education 303. [1-3; 1-3]

404. (3) *Curriculum and Instruction in Art (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in art, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]

**405. (3) *Design II*.—Prerequisite: Art Education 305. [1-3; 1-3]

407. (3) *Graphic Arts II*.—Prerequisite: Art Education 307. [1-3; 1-3]

413. (3) *Ceramics and Modelling III*.—Prerequisites: Art Education 303 and 403. [1-3; 1-3]

**415. (3) *Design III*.—Prerequisites: Art Education 305 and 405. [1-3; 1-3]

417. (3) *Graphic Arts III*.—Prerequisites: Art Education 307 and 407. [1-3; 1-3]

425. (3) *Curriculum and Instruction in Art II*.—Required of all Elementary Art majors. Prerequisite: Art Education 323. [1-3; 1-3]

441. (3) *Art Education Theory and Research*.—Art theories and research are studied relative to school practices. Prerequisite: 15 units of Art Education, or Fine Arts.

442. (3) *Teaching Sculpture in the Public Schools*.—Traditional and contemporary techniques in sculpture and their application to the teaching of sculpture (three dimensional art) in elementary and secondary schools. Prerequisites: Art Education 100, 201, 302.

508. (1½-6)**c** *Review of Research in Art Education Methods*.—Studies of recent research bearing on art education practice.

541. (1½-4½)**c** *Theory and Principles of Art Education*.—History, theories, principles, methods and practices of art education. The place and contribution of art in total education. Prerequisite: a major in Art Education.

561. (1½-6)**c** *Laboratory Practicum*.

565. (1½/3)**d** *Special Topics in Art Education*.

580. (1½-6)**c** *Problems in Education*.—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences*.—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis*.

601. (1½-6)**d** *Doctoral Seminar*.

Arts I—See Faculty of Arts.

Asian Area Studies—See Faculty of Arts.

Asian Studies (Faculty of Arts)

(For courses in Korean Studies, please consult the Department of Asian Studies.)

Asian Languages

300. (3) *Studies in an Asian Language, (Basic Course)*.—Introduction to the fundamentals of an Asian language not normally taught in the Department. Not given every year. Consult Department for details. [3-1; 3-1]

400. (3) *Studies in an Asian Language*.—(Intermediate Course). Prerequisite: Asian Languages 300 or instructor's permission. [3-1; 3-1]

Asian Studies

105. (3) *Introduction to East Asia*.—Geographical, ethnic and historical backgrounds of China, Japan and Korea. Survey of twentieth-century East Asian History. Same as History 171. [3-0; 3-0]

115. (3) *Introduction to South Asia*.—Geographical, cultural, and historical backgrounds to India, Pakistan, Bangladesh and Sri Lanka. Problems of political, economic, and social development since 1947. Same as History 170. [3-0; 3-0]

206. (3) *Introduction to Southeast Asia*.—Geographical, cultural, and historical backgrounds of Indonesia, Malaysia, Singapore, Brunei, Burma, Thailand, Kampuchea, Laos, Vietnam and the Philippines. Problems of nationalism, foreign policy, economic and social development since 1941. Open to First Year students. Same as Anthropolgy 206. [3-0; 3-0]

225. (3) *Introduction to Japanese Culture*.—Literature, theatre, cinema, painting, religion, traditions, customs, festivals, and crafts; their mutual relationships; the relationship between material and non-material culture. Not offered every year. [3-0; 3-0]

270. (3) *Modern China and the West*.—Same as History 270.

302. (3) *Chinese Literature in Translation*.—An introduction to Chinese literature from ancient times to c. 1800. [3-0; 3-0]

309. (3) *Far Eastern Diplomatic History, 1800-1950*.—Same as History 309.

320. (3) *History of Chinese Civilization*.—A survey of Chinese history and culture from ancient times to 1840, with emphasis on the period up to A.D. 1000. Same as History 382. [3-0; 3-0]

321. (3) *The Civilization of Late Imperial China*.—Evolution of Chinese civilization from ca. 1000 to 1600. The cultural and political legacy of the Sung period; the impact of the period of Mongol domination; the Ming period. Cultures of peoples who ruled part or all of China will be touched upon. Not offered every year. Same as History 381. [3-0; 3-0]

325. (3) *History of Chinese Thought*.—The development of Chinese philosophy and ethics from their beginnings through the nineteenth century, with emphasis on Confucianism, Taoism and Buddhism. Attention will be given both to ideas themselves and to their relationship with cultural context. Same as Philosophy 323. [3-0; 3-0]

330. (3) *History of Japanese Civilization*.—Japanese political, social, and cultural history from the earliest times to 1868. Same as History 383. [3-0; 3-0]

335. (3) *Traditional Japanese Literature in Translation*.—An introduction to Japanese literature from the earliest times to mid-nineteenth century. [3-0; 3-0]

340. (3) *History of Indian Civilization*.—Political and cultural history from the earliest times to the Medieval period. Same as History 384. [3-0; 3-0]

345. (3) *Indian Literature in Translation*.—A survey of classical and modern literature in translation. [3-0; 3-0]

350. (3) *The Mythological Literature of South Asia in Translation.*—The texts will be selected so as to present the stages in the history of South Asian literatures, the types of South Asian myths, and the variety of literary representation that myths enjoy in South Asia. Not given every year. [3-0; 3-0]

355. (3) *Philosophical Tradition of India.*—Introduction to various schools of Indian philosophy from the standpoint of analytical philosophy. Reading of (a) articles and books in English surveying the secular component in the Indian philosophical tradition, and (b) English translations of Sanskrit texts discussing epistemological and ontological issues, including those texts which realize the relevance of language in discussing these issues. Not given every year. Same as Philosophy 355. [3-0; 3-0]

365. (3) *History of Chinese Religions.*—A history of religious institutions, rituals, ideas and ethics in China from antiquity to the present. Attention will be given to state cults, Taoism, Buddhism, and popular religion as well as to important themes such as ancestor worship and meditation. Not given every year. Same as Religious Studies 365. [3-0; 3-0]

370. (3) *Studies in the History of a Major Asian Civilization.*—Study of an Asian culture area different from those covered in existing courses. Not given every year. Consult Department for details. [3-0; 3-0]

375. (3) *A Specific Asian Literature in Translation.*—Introduction to the literature of a linguistic area of Asia not covered in existing courses. Not given every year. Consult Department for details. [3-0; 3-0]

380. (3) *Modern Chinese History since 1840.*—Same as History 380.

385. (3) *History of India since 1800.*—Same as History 385.

405. (3) *Communist Movements in Eastern Asia.*—A survey of the growth, organization, ideology and programs of Communist Parties in East Asia since 1920, with special emphasis on the Chinese Communist movement and the Chinese People's Republic. Not offered every year. [3-0; 3-0]

415. (3) *Modern Chinese Fiction in Translation.*—Reading of selected novels and stories written between 1750 and the present. Not given every year. [3-0; 3-0]

417. (3) *Chinese Political Thought and Institutions.*—Chinese theories and practices of government and administration from earliest times to 1949. Same as Political Science 431. [2-1; 2-1]

420. (3) *Contemporary South Asia.*—Problems of modernization and external relations of India, Pakistan, Bangla Desh and Sri Lanka since 1947.

422. (3) *Modern Japanese History since 1800.*—Same as History 422.

423. (3) *Individualism in Modern Japan.*—The individual in conflict with tradition and the state in the late nineteenth and twentieth centuries. [3-0; 3-0]

430. (3/6)**d** *Readings in Chinese Religious Texts.*—Selected readings from primary texts in Confucianism, Taoism and Buddhism. Prerequisite: Chinese 301 or equivalent. The course may be taken twice for credit. Same as Religious Studies 430. [3-0; 3-0]

434. (3) *History of Southeast Asia since 1800.*—Same as History 434.

435. (3) *Modern Japanese Novels in Translation.*—A critical examination of representative works in Japanese fiction from 1868 to the present. [3-0; 3-0]

438. (1½) *Problems in International Relations: South Asian States in World Affairs.*—See International Relations, Faculty of Arts. [3-0; 3-0]

450. (3) *History of Rural Societies in Asia*—A study of the historical structures and transformations of rural societies in Eastern, Southeastern and Southern Asia, from the 18th century. Same as History 482. [3-0; 3-0]

480. (3) *Economic and Social History of Modern China to 1949.*—Same as History 480.

501. (1½/3)**d** *Research Methods and Source Materials in Classical Chinese Studies.*

502. (1½/3)**d** *Research Methods and Source Materials in Early Vernacular and Modern Chinese Studies.*

503. (1½/3)**d** *Problems in the History of the Chinese Language.*

504. (1½/3)**d** *Studies in Chinese Paleography.*

508. (1½/3)**d** *Topics in Pre-modern Chinese History and Institutions.*

509. (1½/3)**d** *Aspects of Chinese Popular Thought and Religion.*

512. (1½/3)**d** *Advanced Readings in Classical Chinese.*—Prerequisite Chinese 400 or equivalent.

513. (1½/3)**d** *Topics in Classical Chinese Literature.*

514. (1½/3)**d** *Topics in Early Vernacular and Modern Chinese Literature.*

521. (1½/3)**d** *Research Methods and Source Materials in Japanese Studies.*

522. (1½/3)**d** *Introduction to kambun kundoku.*—Prerequisite: Japanese 301.

523. (1½/3)**d** *Topics in the History and Structure of the Japanese Language.*

528. (1½/3)**d** *Problems of Japanese Intellectual History.*

532. (1½/3)**d** *Topics in Traditional Japanese Literature.*

533. (1½/3)**d** *Topics in Modern Japanese Literature.*

541. (1½/3)**d** *Research Methods and Source Materials in Indic Studies.*

543. (1½/3)**d** *Topics in the History and Structure of Indian Languages.*

546. (1½/3)**d** *Topics in Indian Literatures.*

553. (1½/3)**d** *Topics in Early Indian Civilizations.*

561. (1½/3)**d** *Problems of Modernization in Eastern and Southern Asia.*

570. (1½/3)**d** *Approaches to Asian Literature.*

599. (3/6)**c** *Master's Thesis.*

699. *Ph.D. Thesis* (in Chinese, Japanese, or South Asian Studies only).

Chinese

100. (3) *Basic Chinese.*—An introduction to the grammar and syntax of spoken and written Chinese. (First term). Normally Chinese 100 and 101 will be taken in the same year. [6-2; 0-0]

101. (3) *Basic Chinese.*—Continuation of Chinese 100. (Second term). [0-0; 6-2]

180. (6) *Intensive Summer Course in Chinese.*—Equivalent to Chinese 100 and 101.

200. (3) *Intermediate Chinese.*—Further study of the grammar and syntax of modern Chinese. Prerequisite: Chinese 100 -101 or 180 or equivalent. [3-1; 3-1]

201. (3) *Intensive Modern Chinese.*—To be taken in conjunction with Chinese 200. [3-1; 3-1]

280. (6) *Intensive Summer Course in Intermediate Chinese.*—Equivalent to Chinese 200-201. Prerequisite: Chinese 100-101 or 180 or equivalent.

300. (3) *Advanced Modern Chinese.*—Modern Chinese with emphasis on readings of contemporary literature and newspapers. Only for students who do not have a good reading knowledge of modern Chinese before entering university. Prerequisite: Chinese 200 [3-0; 3-0]

301. (3) *Classical Chinese I.*—Introduction to Classical Chinese. May be taken in conjunction with Chinese 200 by permission of the Department. Prerequisite: Chinese 100 -101 or 180, or equivalent. [3-0; 3-0]

302. (3) *Advanced Chinese Conversation, Comprehension, and Composition.*—This course will provide an opportunity for advanced students of Chinese to gain greater mastery over the vernacular language through discussion and analysis of selected topics in Chinese civilization. Prerequisites: Chinese 200 and 201, or equivalent. [3-0; 3-0]

305. (3) *Readings in Twentieth Century Chinese Literature.*—For students who have acquired a good reading knowledge of modern Chinese before entering university. [3-0; 3-0]

342. (3) *Reading Course in Chinese for Honours Students.*

400. (3) *Classical Chinese II.*—More advanced reading in Classical Chinese literary, historical and philosophical texts. Prerequisite: Chinese 301 or equivalent. [3-0; 3-0]

405. (3) *Readings in Early Modern Chinese Literature.*—Selected texts from pre-twentieth century drama and fiction. For students who have acquired a good reading knowledge of modern Chinese before entering university. Prerequisite: Chinese 301 or equivalent. [3-0; 3-0]

410. (3) *Twentieth-Century Chinese Authors.*—Selected novels, stories, and poetry. Only for students who do not have a good reading knowledge of modern Chinese before entering university. Prerequisite: Chinese 300. [3-0; 3-0]

411. (3) *Pre-modern Chinese Fiction and Drama.*—Selected passages from thirteenth-century drama and seventeenth- to nineteenth-century fiction. Only for students who do not have a good reading knowledge of modern Chinese before entering university. Prerequisite: Chinese 301. [3-0; 3-0]

413. (3) *Readings in Classical Chinese Poetry.*—Translation and analysis of selected works, especially from the pre-Han, Han, Tang, and Sung periods. Prerequisite: Chinese 301. [3-0; 3-0]

414. (3) *Tz'u and ch'u.*—Readings in the popular song tradition of Chinese poetry of the Five Dynasties, Sung, and Yuan periods. Not given every year. Prerequisites: Chinese 301, Asian Studies 302 or their equivalents. [3-0; 3-0]

425. (3) *Readings in Chinese Philosophical Texts.*—Selected readings from primary texts in the history of Chinese thought exclusive of Buddhism. Not given every year. Prerequisites: Chinese 301 and Asian Studies 325 or their equivalents. [3-0; 3-0]

440. (1½/3/6/9)**c** *Supervised Study in the Chinese Language.*—Primarily for graduate students.

442. (6) *Tutorial in Chinese for Honours Students.*—This course will require the presentation of at least one research paper.

Indic Languages

300. (3) *Introductory Hindi.*—An introduction to spoken and written Hindi. [3-1; 3-1]

305. (3) *Introductory Sanskrit.*—Basic vocabulary and most important grammatical features of classical Sanskrit. Useful to students of South Asian history, culture, languages, philosophies, and religions, and of linguistics and classics. [3-0; 3-0]

310. (3) *Accelerated Hindi.*—For students with knowledge of another North Indian language before entering university. Prerequisite: consent of instructor. [3-0; 3-0]

400. (3) *Intermediate Hindi.*—Further study of the grammar and introduction to the literature of Hindi. [3-1; 3-1]

401. (3) *Readings in Urdu.*—Introduction to Urdu script, and readings in Urdu prose and poetry. Prerequisite: Hindi 400 or Hindi 310. [3-0; 3-0]

405. (3) *Medieval Hindi.*—Introduction to medieval Hindi grammar, and readings in medieval poetry (Tulsidas, Surdas, Kabir, etc.). Prerequisite: Hindi 400 or Hindi 310. [3-0; 3-0]

410. (3) *Readings in Modern Hindi.*—Combines a survey of modern Hindi prose and poetry with advanced conversation and composition. Prerequisite: Hindi 400 or Hindi 310. [3-0; 3-0]

414. (3) *Intermediate Sanskrit.*—Advanced grammar and selected readings. [3-0; 3-0]

424. (3) *Further Readings in Sanskrit.*—Study of selected texts belonging to a particular period (e.g. Vedic) or representing a specific branch of *kāvya* (poetic literature) or *śāstra* (technical-philosophical literature). Prerequisite: Sanskrit 414. [3-0; 3-0]

440. (1½/3/6/9)**c** *Supervised Study in Indic Languages.*

Japanese

100. (3) *Intensive Basic Japanese.*—An outline of the grammar and syntax of the spoken language together with an introduction to the Japanese script. (First term). Normally Japanese 100 and 101 will be taken in the same year. [6-2; 0-0]

101. (3) *Intensive Basic Japanese*.—Continuation of Japanese 100. (Second term). [0-0; 6-2]
102. (3) *Basic Japanese*.—Equivalent to Japanese 100, but spread out through the year. [3-1; 3-1]
103. (3) *Basic Japanese*.—Equivalent to Japanese 101, but spread out through the year. Prerequisite: Japanese 102 or permission of the Instructor. [3-1; 3-1]
180. (6) *Intensive Summer Course in Japanese*.—Equivalent to Japanese 100 and 101.
200. (3) *Intermediate Japanese Reading and Writing*—Reading and writing of modern colloquial Japanese at an intermediate level. Prerequisite: Japanese 100 and 101, or 102 and 103. [3-1; 3-1]
201. (3) *Intermediate Japanese Conversation and Composition*.—To be taken normally in conjunction with Japanese 200. Prerequisite: Japanese 100 and 101, or 102 and 103. [3-1; 3-1]
280. (6) *Intensive Summer Course in Intermediate Japanese*.—Equivalent to Japanese 200 and 201. Prerequisite: Japanese 100 and 101, or 102 and 103, or equivalent.
300. (3) Advanced Modern Japanese.—Readings in Japanese prose. [3-0; 3-0]
301. (3) *Classical Japanese, I*. [3-0; 3-0]
302. (3) *Advanced Conversation and Composition*.—Improvement of speaking and writing in modern Japanese through grammatical analysis, oral practice, conversation and composition. [3-0; 3-0]
310. (3) *Japanese for Specialists of China*.—Readings in Japanese material dealing with Chinese for students who have a reading knowledge of Chinese. Prerequisites: Japanese 100 and 101, or equivalent; a reading knowledge of Chinese. [3-0; 3-0]
315. (3) *Japanese for Professional Life*.—Technical Japanese as it is used in business, commerce, industry, science, technology, law, etc. Emphasis on grammatical and syntactical features of such special uses of the language and on specialized, current vocabulary. Prerequisite: Japanese 200 or 201 or 280. [3-0; 3-0]
342. (3) *Reading Course in Japanese for Honours Students*.
400. (3) *Readings in Modern Japanese Prose*.—Modern essays and criticism; journalistic and scholarly writing. Prerequisite: Japanese 300. [3-0; 3-0]
401. (3) *Classical Japanese, II*.—Advanced reading in Classical Japanese literary, historical, and philosophical texts. [3-0; 3-0]
402. (3) *Readings in Japanese Poetry*.—Translation and analysis of selected works from classical, medieval and modern periods. Prerequisite: Japanese 300 and 301, or equivalent. [3-0; 3-0]
416. (3) *Journalistic Prose*.—The aim of the course will be to develop fluency in reading contemporary Japanese newspapers. Concentration on current and emerging vocabulary, evolving grammatical features, and style of presentation. Not offered every year. Prerequisite: Japanese 300, or instructor's permission. [3-0; 3-0]
440. (1½/3/6/9)c *Supervised Study in the Japanese Language*.—Primarily for graduate students.
442. (6) *Tutorial in Japanese for Honours Students*.—This course will require the presentation of at least one research paper.

Astronomy (Faculty of Science)

For Geophysics courses, see listing under "Geophysics."

200. (3) *Astronomy*.—An introduction to many aspects of Astronomy, including: the earth, the solar system, stellar structure and evolution, red giant and white dwarf stars, neutron stars, black holes, galaxies, quasars, cosmology and radio astronomy. Prerequisite: Physics 110, 115 or 120 (or equivalent). [3-0; 3-0]
302. (1½) *Galactic Astronomy*.—Basic observational data and theoretical interpretation relating to the structure of our galaxy. Topics include the galactic distance scale, the distribution and kinematics of the stars and gas in the galaxy, star clusters and stellar populations. Prerequisites: Three units of Physics at the 200 level or above or permission of Head of Department. Astronomy 200 is recommended. [3-0; 0-0]
303. (1½) *Extragalactic Astronomy*.—A topics course emphasizing basic physical processes which determine the observed characteristics of external galaxies, including radio galaxies and other active systems. Clusters of galaxies and the large scale structure of the Universe will be discussed. Prerequisite: Three units of physics at the 200 level or above or permission of the Head of the Department. Astronomy 200 is recommended. [0-0; 3-0]
310. (3) *Exploring the Universe*.—A discussion of modern topics of Astronomy and Geophysics without the use of advanced mathematics. Topics covered will include: cosmology; galaxies, quasars, stellar evolution, pulsars, "black holes", origin of the solar system and age of the earth, space exploration, the earth's gravity and magnetic fields, seismology and earthquakes, continental drift and ice ages. This course is open only to students in Third or higher years not registered in the Faculty of Science or Applied Science. No background in science or mathematics is required. Same course as Astronomy 310 and Geophysics 310. [3-0; 3-0]
315. (3) *The Solar System*.—A study, including theories of the origin and evolution of the sun, planets, comets, asteroids, meteorites, and the interplanetary medium. Prerequisite: Three units of Physics at the 200 level or above. (Same as Geophysics 315). [3-0; 3-0]
401. (1½) *Stellar Astrophysics*.—Physical principles determining the structure and evolution of stars including the Sun. These will include nuclear reactions, radiative transfer and the state of matter in stars. Prerequisite. Physics 203. [3-0; 0-0]
402. (1½) *Non-Stellar Astrophysics*.—A topics course which will discuss physical processes relating primarily to diffuse matter in space. The topics will include the interstellar medium, gaseous nebulae and both thermal and non-thermal radiation processes in our own and external galaxies. Prerequisite or corequisite: Physics 203, 301. [0-0; 3-0]
421. (2) *Astronomical and Astrophysical Measurements*.—Astronomical instrumentation for satellite and ground-based optical and radio observations, theory of measurement of stellar spectra and radiative flux and applications to understanding stellar masses, temperatures, magnetic fields, galactic structure, and interstellar material. Prerequisites: Physics 308 or equivalent, Mathematics 315 or equivalent (concurrently). [2-0; 2-0]
431. (1) *Astronomical Laboratory*.—Experiments in the use of basic measuring instruments, study of stellar spectra, photometric records, star charts, use of 16-inch reflector for observations. Prerequisites: Astronomy 421 (concurrently). [0-3; 0-3]
449. (1-3)c *Directed Research in Astronomy*.—The student will investigate a research problem under the direction of a staff member. (If elected for 3 units, a thesis will be required.)
500. (3) *Principles of Modern Astronomy*.—An introduction to the physical processes occurring in the stars, the interstellar medium, and in our own and other galaxies. (Fourth-year honours students may elect this course with special permission of the Head of department.) Prerequisites: fourth year Physics honours program, or permission of the Head of Department.
503. (1-3)c *Observational Astronomy*.—Critical discussion of modern ground-based and satellite borne instrumentation for astronomical observations in all spectral regions. Description of measuring engines and reduction techniques.
504. (1-3)c *Stellar Astronomy*.—The study of the structure of stellar interiors and stellar atmospheres and the physical processes occurring in them; the interpretation of stellar spectra; nucleosynthesis, and related problems.
505. (1-3)c *Galactic Astronomy*.—The study of the structure, content and evolution of our own and other galaxies, including the study of the physical processes occurring in the interstellar medium and galactic nuclei.
530. (1-3)c *Directed Studies in Astronomy*.
534. (1-3)c *Studies in Stellar Structure*.
535. (1-3)c *Studies in Stellar Atmospheres*.
536. (1-3)c *Studies of the Interstellar Medium*.
537. (1-3)c *Studies in Extra Galactic Astronomy*.
549. (6) *M.Sc. Thesis*.
649. *Ph.D. Thesis*.

Audiology and Speech Sciences

(School of Audiology and Speech Sciences, Faculty of Medicine)

500. (2) *Acoustic Phonetics*.—Study of the acoustic characteristics of speech with reference to their physiological and perceptual correlates. Discussion of the major theories; experimental methods and research findings. [4-1; 0-0]
501. (2) *Instrumental Phonetics*.—Study of instrumental methods in speech research, in particular, sound spectrography, speech analysis and synthesis. Lectures, demonstrations and laboratory work. [4-2; 0-0]
502. (2) *Mechanisms of the Auditory System*.—Concepts and principles basic to the understanding of the normal hearing process, including auditory physiology and theories of hearing. [2-0; 2-0]
503. (2) *Auditory Functions - Selected Topics*.—Critical study of current theories of hearing, psychoacoustics, recent advances in bioacoustics. [2-0; 2-0]
504. (3) *Developmental Phonology*.—Phonetic skills: discrimination, production and transcription; critical survey of research in child speech development; analysis of methodology and research techniques. [3-0; 3-0]
505. (3) *Acquisition of Language*.—Critical examination of theoretical approaches to the acquisition of language; historical, psychological and philosophical implications, combined with critical survey of research in the field, including analysis of methodologies and research techniques. [3-0; 3-0]
506. (1½) *Speech Perception*.—Critical review and analysis of current theories and research in speech perception, including motor theory, analysis by synthesis, and categorical perception in relation to infant, adult and animal data.
507. (1½) *Neurolinguistics*.—Concepts and principles basic to the understanding of language breakdown following closed head-injury, and traumatic head-injury. Critical review of linguistic research in the aphasias in adults and children.
508. (3) *Clinical Audiology*.—Causes and effects of hearing impairment; the audiologist's role in assessing and treating the hearing impaired; principles of audiologic test procedures and administration of the basic audiologic test battery. Includes lab.
509. (3) *Clinical Speech-Language Pathology*.—Communication disorders including voice, resonance, fluency, articulation/phonological and language disorders in children and adults. Lab included.
510. (2) *Advanced Clinical Audiology*.—Available only to second-year students. (a) Review of past and current literature important to development of special test procedures for diagnostic evaluation of auditory problems; and (b) Review of past and current literature contributing to improvement of rehabilitation programs for hearing impaired children and adults.
511. (2) *Advanced Clinical Speech-Language Pathology*.—Review of the literature pertinent to assessment and treatment of communication disorders; special topics in communication disorders. Open only to second year students.
541. (1) *Clinical Practice in Audiology*.—Clinical experience with basic audiologic procedures covered in AUDI 508 including diagnostic evaluation and aural rehabilitation for hearing impaired children and adults.

542. (1) *Clinical Practice in Speech-Language Pathology.*—Clinical experience in assessing and treating individuals with communication disorders covered in AUDI 509.

543. (2) *Advanced Clinical Practice in Audiology.*—Designed for students concentrating in audiology in their second year, this course refines clinical skills through a variety of clinical experiences in diagnostic audiology and aural rehabilitation with children and adults.

544. (2) *Advanced Clinical Practice in Speech-Language Pathology.*—Refinement of clinical skills through experience in assessing and treating a variety of communication disorders. Available only to second year students concentrating in speech-language pathology.

546. (3) *Seminar in Problems of Audiology and Speech Sciences.*

547. (1½/3)c *Directed Reading and Conference.*

548. (1) *Departmental Seminar.*

549. (3) *M.Sc. Thesis.*

649. *Ph.D Thesis.*

Biochemistry (Faculties of Medicine and Science)

300. (3) *Principles of Biochemistry.*—A lecture course dealing with the structure, function and metabolic reactions of proteins, carbohydrates, nucleic acids, lipids and steroids; enzymology and bioenergetics; biochemical transfer of genetic information and protein synthesis; regulatory mechanisms; control of cellular activity. Credit will not be given for more than one of Biochemistry 300, 302, or 303; *refer also to Biology 201.* Prerequisite: Chemistry 203 or 230. (Students in the Faculty of Science are advised not to take this course unless their standing in the prerequisite is at least 60%). **This course, or the equivalent (e.g. Biology 201 plus Biochemistry 302), is prerequisite to all other 400-level courses in Biochemistry.** [3-0; 3-0]

301. (1½) *Biochemistry Laboratory.*—A course to demonstrate the chemical and physical properties of the fundamental components of cells and some of the techniques by which these properties are studied. Biochemistry 300, 302, or 303 must precede or be taken concurrently with this course. [0-3-1; 0-3-1]

302. (1½) *Biochemistry.*—A lecture course on the structure, function and metabolic reactions of nucleic acids, lipids and lipid metabolism, steroids, nucleotides and amino acids. In addition, the biochemical transfer of genetic information, protein synthesis and regulatory mechanisms will be covered. This course is not intended for Majors and Honours students in Biochemistry. Prerequisite: Chemistry 203 or 230, and Biology 201. Credit will not be given for more than one of Biochemistry 300, 302, or 303. [3-0; 0-0]

303. (3) *Biochemistry.*—Intermediary metabolism and the biochemical flow of genetic information will be covered. Emphasis will be placed on the rationale of key experiments. This course is designed for Honours and Majors in Biochemistry and other life science students. Prerequisite: Chemistry 203 and Biology 201. Credit will not be given for more than one of Biochemistry 300, 302, or 303. [3-0; 3-0]

400. (3) *Human Biochemistry.*—A lecture course for medical students covering metabolism, molecular biology, and biochemical aspects of specialized tissues. Prerequisites: Biochemistry 300 or Biology 201 and Chemistry 203 or 230. Restricted to students in the Faculty of Medicine and others with permission of the Department Head.

402. (1½) *Proteins: Structure and Function.*—The chemical and physical properties of proteins in relation to their biological function. Emphasis will be given to current techniques used in the study of proteins. At least a second class standing in Biochemistry 300, 302 or 303 is recommended. [3-0; 0-0]

403. (1½) *Enzymology.*—Properties of enzymes, mechanisms of enzyme action, regulation of enzyme activity. At least a second-class standing in Biochemistry 300, 302 or 303 is recommended. [0-0; 3-0]

404. (1) *Biochemical Methods.*—Lectures on advanced biochemical techniques and their application to biochemical problems. Restricted to Honours students in biochemistry or others with permission of Department Head. [1-0; 1-0]

410. (1½) *Nucleic Acids — Structure and Function.*—Chemical, physical and biological properties of nucleic acids with emphasis on current topics related to the replication, transcription, translation and regulation of genetic material. Credit will not be given for both Biochemistry 410 and 510. Prerequisite: Biochemistry 303 and Microbiology 325. Students who obtain less than 65% in either prerequisite are strongly discouraged from registering in BIOC 410. [3-0; 0-0]

420. (1½) *Advanced Biochemical Techniques.*—Laboratory emphasizing biochemical techniques such as cell fractionation, protein purification, spectrophotometry, electrophoresis, chromatography, and ultracentrifugation. Enrolment restricted to Honours students in Biochemistry and others with permission of the Head of the Department. Corequisite: Biochemistry 404. [0-6; 0-0]

421. (1½) *Recombinant DNA Techniques.*—Advanced laboratory course emphasizing recombinant DNA techniques including transposon mutagenesis, restriction enzyme mapping, chemical DNA sequencing, Southern blot analysis and M13 cloning and sequencing. Enrolment restricted to Honours students in Biochemistry and others with permission of the Head of the Department. Prerequisite: Biochemistry 410. [0-0; 0-6]

448. (1½) *Directed Studies in Biochemistry.*—Permission of Department Head is required.

449. (1½/3)c *Honours Thesis.*—A research problem under the direction of a faculty member. Restricted to Honours students.

501. (1-3)c *Advanced Biochemistry Laboratory.*—A laboratory course in advanced biochemical techniques. Biochemistry 404 or its equivalent is required. Students are strongly recommended to take Biochemistry 404 and Biochemistry 501 concurrently. Admission to Biochemistry 501 is limited and is by permission of the Head of the Department of Biochemistry.

503. (1) *Molecular Biochemistry.*—A lecture course in molecular biology: replication, transcription, gene organization, gene expression. Credit will not be given for both BIOC 303 and 503.

508. (1½) *Structure of Membranes.*—Current views on the organization, states and mutual interactions of major components in membranes. Chemistry 305 recommended. Given in alternate years.

509. (2) *Biochemistry of Membranes.*—The course will consist of lectures and discussions on the biochemistry of membrane lipids, the assembly of membranes, the respiratory chain and electron transport, photophosphorylation and active transport. Prerequisite: Biochemistry 508 recommended. Given in alternate years.

510. (1½) *Nucleic Acids: Structure and Function.*—The chemical, physical and biological properties of nucleic acids with emphasis on current topics related to the replication, transcription, translation and regulation of genetic material. Credit will not be given for both BIOC 410 and 510. Prerequisite: Biochemistry 303 or permission of instructor. [3-0; 0-0]

511. (1½) *Topics in Biochemical Regulation.*—A lecture course dealing with the molecular basis of biochemical regulation. Specific topics will be selected from the following areas: surface and intracellular receptors, regulation of intermediary metabolism, control mechanisms involving cyclic nucleotides, regulation of cell growth and cell differentiation.

530. (1) *Seminar in Biochemistry.*—Attendance is required of all graduate students in Biochemistry. Normally each will present one paper on a topic approved by his/her research adviser or committee or on the results of his/her research.

548. (1-3)c *Directed Studies.*—In special cases, with approval of the Head of the Department, advanced courses may be arranged for graduate students in attendance.

549. (6) *M.Sc. Thesis.*

649. *Ph.D. Thesis.*

Biology (Faculty of Science)

**Additional fees are charged for these courses. See "Special Fees" P. 22.

Note: Biology 101 or 102 is prerequisite to all Biology courses, except Biology 310, 311 and 313. Either Biology 101 or 102 is the prerequisite for admission to Major or Honours programs in the Life Science Departments and either course will meet the First Year Biology requirement of Agricultural Sciences, Dentistry, Family and Nutritional Sciences, Forestry, Medicine, Pharmaceutical Sciences, Physical Education and Recreation, and Rehabilitation Medicine.

**101. (3) *Principles of Biology.*—Open only to students who have not received credit for Biology 11, or the equivalent; attendance is required at a one hour tutorial period each week. An introductory course emphasizing principles of wide application to all living organisms, including cell structure and function, the mechanism of inheritance, evolution, and adaptation to the environment. A comparative approach to the unity and diversity of organisms will be stressed. [3-3-1; 3-3-1]

**102. (3) *Principles of Biology.*—Open only to students who have received credit for Biology 11 (or Biology 11 and 12), or the equivalent. (Optional tutorials of one hour per week are available.) An introductory course emphasizing principles of wide application to all living organisms, including cell structure and function, the mechanism of inheritance, evolution, and adaptation to the environment. A comparative approach to the unity and diversity of organisms will be stressed. [3-3; 3-3]

**200. (1½) *Cell Biology I: Structural Basis.*—A study of the structure, and function at all levels, of the nucleus and cytoplasm of plant and animal cells, with consideration of some important dynamic processes at the cellular level. Topics considered include instrumentation, membrane models, cytoplasmic organelles, the cell cycle, and nucleocytoplasmic interactions. Students are normally expected to take Biology 201 (for which Chemistry 230 or 203 are co-requisites) as a companion course. Prerequisite: Biology 101 or 102. [3-0-2*; 0-0-0]

201. (1½) *Cell Biology II: Introduction to Biochemistry.*—An introduction to structural and functional aspects of cell chemistry. Topics to be discussed include biological micro-and macromolecules and their relationships, protein structure and enzyme action, energy transfer, selected metabolic sequences with reference to control mechanisms. Prerequisites: Biology 101 or 102, Biology 200 and concurrent registration in Chemistry 230 or 203. Credit will be given for only one of Biology 201 or Biochemistry 300. [0-0-0; 3-0-0]

202. (3) *Cell Biology: Structural and Chemical Basis.*—An introduction to cell structure and cell chemistry. Topics to be discussed include nuclear and cytoplasmic structures of plant and animal cells, molecular biology of information storage and utilization, cell cycle and cell reproduction, biological micro- and macromolecules, protein structure and enzyme action, energy transfer, and selected metabolic sequences. Prerequisites: Biology 101 (or 102); Chemistry 230 (or 203). Offered in the Summer Session only. (Credit will be given for only one of Biology 202 or Biology 200 plus 201.)

300. (1½) *Biometrics.*—Introduction to statistical procedures applied to biological research. Prerequisites: Mathematics 100 and 101 or the equivalent, and third year standing. Credit will be given for only one of Biology 300 and Plant Science 321. [3-0-2; 0-0-0] or [0-0-0; 3-0-2]

301. (1½) *Biomathematics*—Introduction to uses of mathematics in the biological sciences. Special emphasis on experimental design and modelling of biological processes. Prerequisite: Biology 300 or permission of the instructor. Credit will be given for only one of Biology 301, or Plant Science 322, or Forestry 430, or Statistics 305. [0-0; 3-0]

302. (1½) *Microscopy and Histology.*—An introduction to the theory of microscopy, to micro-technique and to the tissues of plants and animals. Emphasis in the lectures will be placed on general histology, i.e., the structure, function, development, and location of tissues as well as a comparison between plant and animal tissues. [2-3; 0-0]

310. (1½) *Human Heredity and Evolution.*—A course which relates genetic and evolutionary

concepts to man and to human populations. Primarily for students of third and fourth years in the Faculty of Arts. Credit will be given for only one of Biology 101/102 or Biology 310. Not open to students in Departments of the Life Sciences. [3-0-2; 0-0-0] or [0-0-0; 3-0-2]

311. (1½) *Ecology and Man.*—Review of experimental and theoretical ecology emphasizing strengths and limitations of scientific approaches to practical problems confronting mankind; use of case studies to illustrate problems of public policy. Not for credit in Life Sciences. [3-0-2; 0-0-0] or [0-0-0; 3-0-2]

313. (1½) *Microbes and Man.*—An elementary course in molecular biology primarily for Arts students. The historical development of and recent discoveries in molecular biology. Emphasis is placed on bacteria and viruses and their interactions with humans. The implication of research on microbes for human welfare is stressed. Special topics include microbial resistance to drugs, cancer, and genetic engineering. Credit will be given for one only of Microbiology 200 and Biology 313. Not open to students in Departments of the Life Sciences. [3-0; 0-0]

**315. (3) *Protistology.*—An introduction to the understanding of single cells as organisms, irrespective of plant or animal affinities. Special attention is given to environmental adaptations, their significance to ecosystems, and their possible evolutionary implications. The diversity of morphological types is surveyed in view of the above considerations. [2-3; 2-3]

321. (1½) *Population and Community Biology-I.*—An introduction to the principles of ecology. Both plants and animals will be considered and the approach will be mostly qualitative. This course will include a one-day weekend field trip. [3-0-1*; 0-0]

322. (1½) *Population and Community Biology-II.*—The study of the interactions between plant and animal populations and their physical and biological environments. Quantitative concepts will be introduced where appropriate. Biology 321, or equivalent, and Biology 300 are strongly recommended as prerequisite. [0-0; 3-0-1*]

323. (3) *General Ecology*—A study of the broad principles concerning the structure and dynamics of ecosystems. This involves understanding of biotic and abiotic factors, their interrelationships, the vulnerability of the ecosystem to change, and the influence of man and his activities on the ecosystem. The laboratory (field trips) will be used to enrich this understanding and will involve the identification and analysis of the biota of local ecosystems. Offered in the Summer Session only. At registration, each student will be required to pay a fee to cover costs in connection with field trips. (Credit will be allowed for only one of Biology 323 and Biology 321 plus 322.)

**330. (3) *Cell Physiology.*—The physico-chemical basis for cellular activity, with particular emphasis on: energy relationships, functions of cell parts, integration and internal control of cellular activities, mechanisms of influence of external factors, and cell ontogeny. The laboratory work will emphasize the techniques and apparatus used to study cell function. Primarily for students in the Life Sciences but open to others with permission of the instructors. Prerequisite: Biology 200, 201 and Chemistry 230 or 203. [2-3; 2-3]

334. (1½) *Fundamental Genetics.*—An introduction to the basic principles of heredity, with emphasis on the physical and chemical structure and function of genetic material. It is recommended that students normally not register in this course prior to Third Year. Credit will be given for only one of Biology 334, Agricultural Sciences 213 or Forestry 302. [3-0-2; 0-0-0] or [0-0-0; 3-0-2]

335. (3) *Principles of Genetics.*—An introduction to the basic principles of heredity, with emphasis on the physical and chemical structure and function of genetic material. The laboratory will emphasize the resolution of hereditary phenomena by genetic crosses and chromosome studies. Offered in the Summer Session only. (Credit will be allowed for only one of Biology 335 and 334).

**340. (1½) *Principles of Cytology.*—General descriptive study of the cell and its components, with emphasis on their ultrastructures; relation of structure to function. It is recommended that students normally not register in this course prior to Third Year. [0-0; 2-4]

405. (1½) *Marine Ecology.*—A study of the relationship of marine biotic communities to the environment, with emphasis on the intertidal area. Limited to students in Fourth Year. Prerequisites: Zoology 205; Botany 301; Biology 300 (may be concurrent), Biology 321; or their equivalents. [0-0; 2-3]

422. (1½) *Microbial Ecology.*—Microbial diversity; ecological significance of metabolic diversity and structural adaptations. Interactions among the microbial populations; microbial interactions with plants, animals. The effects of microbial activities in nature. Prerequisites: Microbiology 200 or 417, and Biology 201. (This course is the same as Soil Science 311.) [0-0-0; 2-2-1]

434. (1½) *Population Genetics.*—Fundamental aspects of population and quantitative genetics with emphasis on experimental observations and examples from natural populations. Some applications will be discussed. The distribution of genetic variation in the human species is especially emphasized. Prerequisite: Biology 334, Agric. Science 213, Forestry 302, or equivalent, or permission of Chairman, Biology Program. (Biology 434/Medical Genetics 434 are the same course.) [0-0; 3-0]

436. (1½) *Fundamentals of Cytogenetics.*—A detailed consideration of the nucleus and chromosomes as the physical basis for heredity. Prerequisite: Biology 334, or equivalent. [0-0; 2-3]

444. (1-3)c *Recent Advances in Biology.*—An advanced refresher course for school teachers. Three topics each lasting 2 weeks and carrying 1 unit of credit, will be presented each year. Focus will be upon recent developments in major segments of Biology. Prerequisite: A bachelor's degree in Biology, Biological Education, Botany, Microbiology, or Zoology. Offered in Summer Session only: not for credit in the Faculty of Science.

448. (1½-3)c *Directed Studies in Biology.*—A course designed to allow students to undertake an investigation on a specific topic as agreed upon by the faculty and student. Permission of Chairman of Biology Program and supervisor is required.

449. (3) *Directed Biological Research.*—A course designed to allow students to undertake a research project in selected fields prior to research at the graduate level. Open only to honours students in biology, after consultation with the Chairman of Biology Program and with permission of the appropriate supervisor. Presentation of a thesis and an oral examination are required.

503. (1½) *Principles and Techniques in Electron Microscopy I.*—A lecture course on the principles of construction and operation of the microscope; the techniques used in the preparation of materials for examination. An introduction to biological applications. Open to qualified undergraduate students with permission of instructor.

504. (1½) *Principles and Techniques in Electron Microscopy II.*—A laboratory course in the operation of the electron microscope and the biological techniques in electron microscopy. Enrolment limited. Prerequisite: Biology 503.

505. (3) *Comparative Biology.*—A lecture and seminar course on the biochemical aspects of a wide range of organisms with particular reference to biochemical evolution, nature and control of metabolism and the biochemistry of differentiation. Prerequisites: Biochemistry 300 or 302 or 303. Recommend Biology 330, Zoology 428, or Physiology 301 and 302. Open to fourth year Life Sciences students, with permission of instructor.

506. (1½) *Principles of Radiotracer Methodology in Biological Research.*—A comprehensive survey, by assigned reading, tutorials and problem-solving, of the principles of radioactivity and radiotracer methodology as applied to research in the life sciences. First term.

507. (1½) *Biological Applications of Radiotracers.*—A laboratory course including projects and some seminars designed to cover a wide range of problems concerned with techniques, experimental design and interpretation, as well as the handling and disposal of living tissues. Prerequisite: Biology 506. Second Term.

508. (3) *Current Topics in Genetics.*—Recent papers in genetics will be discussed with emphasis on topics concerning chromosomes and gene structure and function. Prerequisite: a genetics course or permission of an instructor.

509. (3) *Advanced Biometrics.*—Topics in advanced statistical methods in relation to biological sciences. Experimental design, multivariate analysis, sampling, theory of error, maximum likelihood estimation and special topics in current literature.

510. (1½) *Ecological Genetics.*—The genetic basis of ecological relationships. A review of basic population genetics will provide the background for further investigations of reproductive strategies, influences of population structure, predator-prey and plant herbivore interactions, crop genetic variability, and other topics on basic and applied ecological genetics. Lectures and discussions. Same as Plant Science 510.

522. (1½) *Seminar in Marine Benthic Ecology.*

523. (1½) *Marine Benthic Ecology.*

548. (1-3)c *Advanced Topics in Biology.*

549. (6/9)c *Master's Thesis.*

649. *Ph.D. Thesis.*

Biophysics

See Anatomy 405, 505, 509 and Physics 305, 405.

Bio-Resource Engineering (Faculty of Applied Science)

250. (1½) *Biosystems for Engineers.*—A course designed to acquaint engineering students with the basic concepts of biosystems and how these concepts relate to engineering. The structure and properties of biosystems at the cellular, organismal and population levels, which have an effect on the solution of engineering problems, will be stressed. The effect of engineering activities upon various ecosystems will be considered. [2-0-2; 0-0-0]

258. (1½) *Principles of Energy Use in Agriculture.*— Sources, flow requirements, substitutions and conservation of energy in relation to operations for farm mechanization, farm structures, feed and food processing, waste management, aquaculture and water management. [3-2; 0-0]

285. (1½) *Introduction to Bio-Resource Engineering Systems Analysis*—The tools of systems analysis with selected applications to the primary renewable resource production enterprises. Emphasis in presentation of written and oral reports. [0-0-0; 2-0-2]

300. (1½) *Principles of Food Engineering (I)*—Units and dimensions, mass balance, steady state and transient heat flow, thermodynamics, fluid flow, fluid handling and measurement. [2-2; 0-0]

306. (1½) *Aquacultural Operations.*—Methods of analyzing and evaluating aquacultural operations including intensive and extensive polyculture production of fish and aquatic plants in fresh and salt water. The use of program evaluation and retrieval techniques and operation process charts in aquacultural process analysis. Energy requirements of alternate production schemes. [0-0; 2-2]

355. (1½) *Physical Properties of Plant and Animal Materials.*—Structure; physical characteristics; mechanical, rheological, thermal, optical and electrical properties of agricultural products. Applications to harvesting, processing, storage and quality evaluation. [0-0-0; 2-2*-2*]

356. (1½) *Principles and Engineering Application of Plant Physiology.*—Application of physiological principles to the modification and control of energy and mass transport in plants during growth and post-harvest storage. Radiation, heat and water balances, nutrient uptake and availability, plant growth analysis and regulation. [2-0-2; 0-0-0]

357. (1½) *Principles and Engineering Applications of Animal Physiology.*—Homeostatic mechanisms in biological systems. Thermal, water, and electrolytic balances. Nervous, endocrine, digestive and reproductive systems. Engineering design of environments to optimize growth. [0-0-0; 2-0-2]

360. (1½) *Irrigation and Drainage*.—Soil-water-crop relationships, different methods of irrigation and drainage. [2-2-0; 0-0-0]

361. (1½) *Soil and Water Engineering*.—An introduction to the fundamental prinicples governing the planning and design of irrigation and drainage systems. Examination of interrelations between drainage-irrigation and soil-water-crop systems. [0-0-0; 2-2*-2*]

366. (1½) *Heat Transfer*.—Basic principles of heat transfer related to building, equipment and process design for aquaculture, agriculture, food process engineering and environmental management. [3-0-0; 0-0-0]

376. (1½) *Applications Heat, Mass and Momentum Transfer*.—Psychrometric relationships, Mollier charts, refrigeration cycles, dehydration, freezing, condensation and boiling, heat transfer, evaporation systems. Heat transfer applications in food processing.[0-0-0; 2-0-2]

461. (1½) *Drainage Engineering*.—Hydrology related to drainage; soil and soil moisture flow of water through soil; theories of drainage; design, construction, and maintenance of soil and sub-surface drainage systems. [2-2-0; 0-0-0]

462. (1½) *Irrigation Engineering*.—Hydrology related to irrigation; plant response to irrigation; determination of irrigation requirements; design of sprinkler, surface, and trickle irrigation systems; soil conservation. [0-0-0; 2-2-0]

471. (1½) *Systems Design I*.—Application of fundamental principles used in engineering design and development of soil-machine systems and bio-material machine systems with primary production case studies from agriculture, aquaculture, and silviculture. Emphasis on individual initiative and application of fundamentals. Term design project. [2-2*-2*; 0-0-0]

472. (1½) *Systems Design II*.—Application of fundamental principles used in the engineering design and development of secondary production systems for handling, processing, and storage of food, feed, and fibre. Emphasis on individual initiative and application of fundamentals. Term design project. [0-0-0; 2-2*-2*]

480. (1½) *Energy and Mass Transport in Food Systems*.—The unit operations pertaining to processing of food and feed. Size reduction, separation, drying, evaporation, thermal process evaluation, refrigeration. [2-2*-2*; 0-0-0]

481. (1½) *Food Engineering*.—Heating, cooling and freezing of food materials. Heat exchange devices. Diffusional operations, physical separations. Storage stability. [0-0-0; 2-0-2]

485. (1½) *Aquacultural Engineering*.—Study of the functional and technical aspects of aquacultural primary production systems for plant and animal species in fresh and in marine waters. Consideration of the inter-relationships between the characteristics of the species and the facilities, equipment and environment with the view of evolving a comprehensive production system. Prerequisite BIOE 306. [0-0-0; 2-0-2]

489. (1) *Seminar*.—Papers, and discussions on recent bio-resource engineering developments. [0-0-2*; 0-0-2*]

490. (1½) *Biomass Conversion and Utilization*.—Methods of handling and treating wastes from the food production and processing industries. [2-2*-2*; 0-0-0]

498. (1-3)c *Directed Studies*.—Requires approval of the department head.

499. (3) *Thesis*.—Research or design problem under the direction of a staff member. [0-2-0; 0-4-0]

540. (1½) *Design of Aquacultural Systems*.—System analysis as a design process applied to intensive and extensive aquacultural multitrophic level fish and plant production processes in salt and/or fresh waters.

549. (6) *Master's Thesis*.—For M.Sc. degree

554. (1½) *Instrumentation for Biomaterial Research*.—Instruments, theory, applications, methods and standards for measuring and recording temperature, flow, pressure, humidity, time, color, force, deformation and length. Application to problems in biomaterial research and food engineering. The purpose of this course is to familiarize the student with methods, techniques and problems of measurement.

555. (1½) *Load Response of Biomaterials*.—The response of biomaterials subjected to static, quasi-static, cyclic and impact loading conditions. Viscoelastic models of biological materials. The relationship between tissue structure and tissue response. Cellular models.

560. (1½) *Small Watershed Systems Design*.—Hydrologic design of water management systems for the production of agricultural and other biological materials. Analysis and design of composite systems for watersheds.

561. (1) *Advance Drainage*.—Theory of land drainage by tile and surface methods. Hydrologic characteristics of drainage systems. Drainage requirements of crops.

562. (1) *Advanced Irrigation*.—Land preparation, irrigation design, water supplies and water control.

563. (1) *Quality of Water Supplies*.—Criteria of water quality related to its use. Factors affecting water quality due to desirable and undesirable processes.

565. (1) *Environmental Control for Food Resource Planning*.—Thermal, psychrometric and illumination control in food resource systems. Special problems associated with high population densities in plant and animal confined housing.

566. (1) *Design of Food Production Systems*.—Labour efficiency, material flow, economic criteria, control of natural hazards.

571. (1) *Bio-Machine Systems*.—Theoretical analyses of unit operations performed by various agricultural and processing machines. Consideration of the interaction between machine parameters and biological parameters.

572. (1½) *Soil-Machine Systems*.—Soil dynamics as applied to tillage and traction. The effect of tillage on soil parameters. Tillage design to create an optimum environment for plant growth.

580. (1) *Engineering Principles Applied to Food Concentration*.—Thermodynamics of water sorption and desorption. Permeability and diffusion of vapours and gases through tissues and protected interfaces. Moisture migration, capillary, slip and molecular flow.

583. (1) *Viscous Properties of Foods*.—Pseudoplastic, dilatent, thixotropic and rheopectic properties of foods. Model systems, food texture.

584. (1) *Thermal Properties of Plant and Animal Products*.—Methods of measurement of enthalpy, specific heat, thermal diffusivity. Steady state and transient heating, cooling and freezing. Kinetics of thermal processing.

590. (1-2)c *Waste Treatment in Agricultural and Food Industries*.—Design and evaluation of current agricultural and food processing waste management practice. Effect of physical properties, environmental factors and pollution potential on treatment methodology.

597. (1-3)c *Topics in Bio-Resource Engineering*.—Lectures and special topics in the field of Bio-Resource Engineering may be arranged upon approval of the Head of the Department.

598. (1) *Seminar*.—Presentation and discussion of current topics in Bio-Resource Engineering research.

599. (3-6)c *Thesis*.—For M.A.Sc. degree.

Botany (Faculty of Science)

**Additional fees are charged for these courses. See "Special Fees" P. 22.

N.B. Biology 101 or 102 is prerequisite to all courses in Botany, except Botany 310.

**209. (1½) *Non-Vascular Plants*.—A study of fungi, algae, lichens and bryophytes, integrating form and function as they are related to adaptation to environment. [3-3; 0-0]

**210. (1½) *Vascular Plants*.—A comparative study of pteridophytes, gymnosperms and angiosperms, integrating form, function and ecology. [0-0; 2-3]

211. (3) *The Plant Kingdom*.—A comparative study of fungi, algae, bryophytes, and vascular plants integrating form, function, and ecology. Offered in the Summer Session only. (Credit will be allowed for only one of Botany 211 and Botany 209 plus 210).

**301. (1½) *Survey of Algae*.—A systematic survey of the algae, considering their morphology, life histories and classification. [3-3; 0-0]

306. (1½) *Structure and Evolution of the Bryophyta*.—A study of evolution, taxonomy and morphology of mosses, liverworts and hornworts with emphasis on living plants in their environment. [0-0; 2-4]

307. (1½) *Structure and Evolution of Ferns and Fern-allies*.—Anatomy, morphology and relationships of the ferns and fern-allies, with assessment of both fossil and extant taxa. [2-4; 0-0]

308. (1½) *Structure and Reproduction of Fungi*.—A systematic survey of slime molds and fungi. [2-3; 0-0]

310. (1½) *Plants and Man*.—An introduction to the interactions of plants and human societies. The role of man in the origins, evolution and dispersal of food, drug and economic plants and the influences of plants on man's economic, cultural and political history will be considered. Suitable for students of third and fourth years in the Faculty of Arts. [2-0-3; 0-0-0]

311. (1½) *Introduction to Seed Plant Taxonomy*.—Introduction to seed plant taxonomy emphasizing descriptive morphology and identification. Each student will be required to submit a plant collection. Same as Plant Science 258. [2-3; 0-0]

312. (3) *Plants of British Columbia and their Environment*.—A field course dealing with the morphology, identification and classification of vascular plants and the principles of plant ecology, using the flora and vegetation of selected areas in British Columbia. A maximum of 3 units possible for combination of Botany 311 and 312. Offered in Spring or Summer Session only.

**330. (3) *Plant Physiology*.—Introduction to physiological processes and their associated structures. Topics include photosynthesis, transpiration, absorption, enzyme and hormone action, and growth. Chemistry 230 is recommended but not required. [2-3-1; 2-3-1]

402. (1½) *Plant Anatomy*.—Internal structure and organization of vascular plants. Prerequisite: Botany 210 or Biology 302, or permission of the Head of Department. [0-0; 2-3]

409. (1½) *Ecology of Fungi*.—Environmental requirements of fungi, their role in various ecosystems, and their relationships with other organisms in the habitat. Prerequisite: Botany 308. [0-0; 2-3]

410. (1½) *Biology of Marine Algae*.—A study of the algae occurring in the marine habitat with emphasis on their identification and ecological relationships. Prerequisite: Botany 301. [0-0-0; 2-3-1]

411. (1½) *Biology of Freshwater Algae*.—A study of the algae occurring in the freshwater habitat with emphasis on their identification and ecological relationships. Prerequisite: Botany 301. [0-0-0; 2-3-1]

**412. (1½) *Phytogeography*.—Description and interpretation of present and past floristic vegetational patterns; integration of evolutionary, ecological, and phytogeographical concepts. Terrestrial and aquatic plants are considered. Restricted to students of Third and Fourth Years. [3-0; 0-0]

413. (1½) *Classification and Relationship of Seed Plants*.—Current classification systems based mainly on comparative morphology, anatomy, embryology and the fossil record. A broad spectrum of seed plant families is considered in the laboratory. Given in alternate years. Prerequisite: Botany 311 or equivalent. [0-0; 2-3]

414. (1½) *Biosystematics of Seed Plants*.—The contribution of cytogenetics, biochemistry, genecology, taximetrics and other studies of knowledge of speciation, evolution and classification. The laboratory applies a variety of techniques to the solution of taxonomic problems. Given in alternate years. Prerequisite: Botany 311 or equivalent. [0-0; 2-3]

415. (1½) *Algal Physiology*.—Environmental physiology of marine algae with an emphasis on physiological adaptations to environmental factors. Laboratory features culturing of algae and analytical techniques useful in measuring physiological response to environmental changes. Prerequisites: Botany 301 and one of Botany 330, Biology 330 or Biology 201 (may be taken concurrently). (Same as Oceanography 415.) [0-0; 2-3]

416. (1½) *Physiology and Biochemistry of Fungi*.—Basic growth requirements, physiology and biochemistry of development, and secondary metabolism of fungi. Prerequisites: Botany 308 and Biology 201, Biochemistry 302 is recommended. Given in alternate years. [0-0; 2-3]

426. (1½) *Plant Ecology I*.—A quantitative approach to the study of plant communities, including a consideration of the vegetation zones of British Columbia. Prerequisite: Biology 321. Botany 311 is recommended. [3-3; 0-0]

427. (1½) *Plant Ecology II*.—Relationships between plants and their physical and biotic environment, including primary production, plant population dynamics, genecology, ecology of reproduction and vegetation change. Prerequisites; Biology 321 and 322. Botany 330 is recommended. [0-0; 3-3]

430. (1½) *Plant Development*.—An integrated study of the physiology and biochemistry of plant development at the molecular, tissue, and environmental level. Prerequisite: Botany 330 or Plant Science 324 and 325, and Biology 201. [2-3; 0-0]

435. (3) *Plant Biochemistry*.—A comparative survey of intermediary metabolism, including the chemistry, biosynthesis, and distribution of organic compounds in the plant kingdom. Prerequisite: Chemistry 203 or 230 and either Biology 201 or Biochemistry 300.[2-3; 2-3]

437. (1½) *Plant Genetics*.—Current plant genetic research with emphasis on molecular aspects. Topics include: the structure and regulation of plant genes; transposable elements in maize; cytoplasmic inheritance, including molecular basis of male sterility and senescence; nitrogen fixation genes; transformation of plant cells and somatic hybridization; crown gall tumors, their formation and characteristics; genetic engineering of plant cells. [3-0-1; 0-0-0]

441. (1½) *Paleobotany*.—A study of fossil plants, emphasizing structure, evolution, and paleoecology. Prerequisite: Botany 210 or equivalent. Given in alternate years. [2-3; 0-0]

442. (1½) *Palynology*.—A study of plant microfossils emphasizing their nature, distribution, recovery, and application to paleoecology. Given in alternate years. [2-3; 0-0]

448. (1½-3) *Directed Studies in Botany*.—A course designed to allow students to undertake an investigation on a specific topic as agreed upon by the faculty and student. Permission of the Department and supervisor is required.

449. (3) *Botanical Research*.—A course designed to allow students to undertake a research project in selected fields prior to research at the graduate level. Open only to majors and honours students in botany, and with permission of the appropriate supervisor.

500. (1) *Field Botany*.—A course designed for students proceeding to a graduate degree in Botany. Attendance may be required at the discretion of the Department as a prerequisite to the degree. The course will last approximately one week and will be held immediately after the sessional examinations in April. A fee payable to the Departmental secretary on registration in September, is levied to help defray expenses. Field studies will focus attention on the ecology, taxonomy and life histories of representative plant groups. Written reports will be required as directed.

501. (1½) *Seminar in Botany*.—This course is compulsory for all graduate students in the Department and should be taken as early as possible, usually in the first or second year of studies.

502. (0) *Thesis Seminar*.—Presentation of the M.Sc. or Ph.D. thesis to the Department in the form of a seminar before the defence of thesis examination and between September and April of the last year of the graduate program. A required course which carries no academic credit: for all graduate students in the Department of Botany.

504. (3) *Advanced Taxonomy of Vascular Plants*.

505. (2) *Cytogenetics of Natural Populations*.—Application of cytogenetic principles to the study of evolution and present-day relationships of vascular plants.

506. (1½) *Reproductive Biology of Vascular Plants*.—Pollination ecology, the function and genetics of pollination systems, mating patterns in plants. The significance of pollination systems to evolution and systematics. Given in alternate years. Prerequisite: Biology 334 and Botany 311.

510. (3) *Advanced Marine Phycology*.—Collection, identification, ecology and life histories of algae; emphasis on marine benthonic forms. Prerequisite: Botany 410.

511. (3) *Advanced Freshwater Phycology*.—Collection, culture techniques, identification, ecology and life histories of the freshwater forms. Prerequisite: Botany 411.

512. (2) *Practical Marine Phytoplankton*.—A field project involving the collection, identification and distributional assessment of a selected group of marine phytoplankton organisms. Prerequisite: Oceanography 506.

513. (2) *Cytology of Marine Algae*.—A cytomorphological study of marine algae, including a detailed discussion of nuclei and chromosomes.

515. (3) *Advanced Mycology*.—Systematics, life histories and ecology of fungi. Emphasis on terrestrial groups in the first term; aquatic fungi in the second term. Prerequisite: A course in Introductory Mycology. [1-4; 1-4]

520. (3) *Advanced Phytogeography*.

526. (1) *Advanced Plant Community Analysis*.

527. (1½) *Dynamics of Plant Populations*.—The processes responsible for the regulation of numbers and mass in plant populations from the seed to the reproducing adult. Prerequisite: Botany 427 (or equivalent).

528. (1½) *Current Topics in Plant Biochemistry*.—Discussions of recent and important papers dealing with the biosynthesis and metabolism of secondary metabolites and proteins in plants and fungi. Attention will also be given to microbial degradation of natural products. First Term.

529. (1½) *Chemical Plant Taxonomy*.—Discussion of the application of chemical and biochemical characters to problems of plant systematics. The usefulness of these characters will be examined with respect to problems at all taxonomic levels.

530. (1½) *Plant Metabolic Physiology*.—Studies of the processes and significance of photosynthesis, respiration, and the metabolism of carbohydrates, nitrogen and lipid compounds in plants.

532. (1½) *Regulation of Plant Growth and Development*.—Discussion of the processes of plant differentiation and their regulation by extrinsic and endogenous factors.

533. (1½) *Short Distance Ion Transport*.—Discussions of the mechanisms of ion transport across plant cell membranes. Topics will include the generation and regulation of electrical and chemical potential gradients across cell and organelle membranes.

534. (1½) *Long Distance Nutrient Transport*.—The translocation of water, and inorganic and organic nutrients within higher plants.

538. (1½) *Topics in Weed Ecology*.—The response of weed species to agricultural management practices will be considered within the context of ecological characteristics that make a species a weed. (Offered in 1982-83 and alternate years). (This course is the same as Plant Science 538).

540. (3) *Advanced Paleobotany and Palynology*.—Detailed studies of plant macro- and microfossils and phylogenetical and paleoecological interpretations.

541. (3) *Structure and Development of Pteridophytes and Gymnosperms*.

542. (3) *Structure and Development of Angiosperms*.

543. (3) *Recent Advances in the Biology of Plant Cells*.—This course will emphasize the integration of biochemical and ultrastructural studies at cellular and subcellular levels. Topics will include biological membranes, mitochondria, chloroplasts, nucleocytoplasmic relations, control of cell division, differentiation, development and other dynamic aspects of cells.

546. (1-6)**c** *Topics in Botany*.

549. (3/6)**c** *Master's Thesis*.

649. *Ph.D. Thesis*.

Business Education (Faculty of Education)

166. (1½) *Curriculum and Instruction in Program 21 Simplified Shorthand*.—The mastery of the theory of Program 21 simplified shorthand and a critical examination of alternative teaching methods. [2-1; 2-1]

176. (1½) *Curriculum and Instruction in Forkner Shorthand*.—The mastery of the theory of Forkner shorthand and a critical examination of alternative teaching methods. [2-1; 2-1]

186. (1½) *Curriculum and Instruction in Pitman Shorterhand*.—The mastery of the theory of Pitman Shorterhand and a critical examination of alternative teaching methods. [2-1; 2-1]

374. (3) *Office Organization and Information Processing*.—Office organization, business communication, reprographics, records management, and word processing. [3-2; 3-2]

377. (1½) *Systems of Data Processing*.—Types and organization of business systems; electronic methods of data processing; criteria and procedures for software evaluation. Teaching methods and projects for secondary schools. Prerequisite: Computing Studies Education 217. [0-0; 2-1]

401. (1½) *Curriculum and Instruction in Keyboarding I*.—Principles and problems of instruction and skill-building on alphanumeric and ten-key keyboards. Prerequisite: Computer Science 114. [3-2;0-0]

402. (1½) *Curriculum and Instruction in Keyboarding II*.—Principles and problems of instruction on business production formats. Text editing. Manual methods of data processing. Prerequisite: Business Education 401. [0-0; 3-2]

404. (3) *Curriculum and Instruction in Business Education (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in business education, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]

410. (3) *Cooperative Programs in Career Education*.—Concepts of career education; the relation of work experience to career education. The role of the co-ordinator in designing and administering cooperative programs. [3-0; 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods*.—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

561. (1½-6)**c** *Laboratory Practicum*.

565. (1½/3)**d** *Special Course in Subject Matter Field*.—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education*.—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences*.—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis*.

Canadian Studies—See Faculty of Arts.

Chemical Engineering (Faculty of Applied Science)

241. (1½) *Mass and Energy Balances*.—Introduction to Chemical Engineering; units; stoichiometry; phase equilibria; mass balances; energy balances. [3-0-1; 0-0-0]

242. (1) *Chemical Process Technology*.—Introduction to processes used in the chemical process industries; problems and lectures emphasize underlying physical and chemical principles. [0-0-0; 2-0-1]

251. (1½) *Transport Phenomena I.*—Fluid Mechanics. Momentum-transfer in fluids in laminar and turbulent flow. Microscopic and macroscopic material, momentum and energy balances. Rheology. Dimensional analysis. Flow in conduits. Pumps. Fluid metering. [0-0-0; 3-0-2*]

261. (½) *Chemical Engineering Lab I.*—Experiments chosen to illustrate principles, physical properties, fluid flow and processes underlying Chemical Engineering. Novel experiments. Field trips may be required. [0-0-0; 0-4*-0]

341. (1½) *Diffusional Operations I.*—Principles and design of equipment for reversible and irreversible stagewise separation by distillation, absorption, adsorption, extraction, etc. Introduction to continuous-contact mass transfer operations. [0-0-0; 3-0-2*]

345. (1½) *Applied Thermodynamics I.*—Basis concepts; energy transformations, conservation and laws of thermodynamics; P-V-T behaviour of pure substances and mixtures; thermodynamic potentials, equilibrium of one-and-multiphase systems, general thermodynamic relations. Applications to thermodynamics and thermochemistry for non-flow and flow systems; physical and chemical equilibrium. Fuels and combustion. Solutions. [2-0-2*; 0-0-0]

346. (1½) *Applied Thermodynamics II.*—Entropy change and production. Entropy balance. Efficiency, availability and exergy. Thermodynamics of irreversible processes. Applications to non-flow and flow systems; heat transfer, mixing, separation, expansion and compression of fluids, power and refrigeration cycles, liquefaction and solidification, two phase flow, etc. Energy conversion. Thermodynamic analysis of industrial processes. [0-0-0; 2-0-2*]

351. (1½) *Transport Phenomena II.*—Heat and mass transfer. Conduction, convection and radiation mechanisms of heat transfer; heat transfer rate; heat exchanger design. Molecular diffusion, mass transfer mechanisms, phase mass transfer coefficients, prediction of mass transfer rates. [3-0-2*; 0-0-0]

353. (1) *Mechanical and Thermal Operations.*—Principles of comminution and screening; of fluo-solid operations including filtration, sedimentation, classification, fluidization, and differential wetting; and of thermal operations such as evaporation and crystallization. [2-0-2*; 0-0-0]

356. (1½) *Process Control.*—Theory and application of automatic control in chemical processes; process dynamics; instrumentation. [0-0-0; 3-0-0]

357. (1) *Interfacial Phenomena.*—Outline of the physics and chemistry of interfaces; discussion of the part played by surface effects in technical processes. [0-0-0; 2-0-0]

358. (1) *Properties of Fluids.*—Prediction of thermodynamic and transport properties of fluids. Behaviour of single and multi-phase systems. [0-0-0; 2-0-0]

359. (1½) *Chemical Engineering Economics.*—Estimation of capital and operating costs; interest calculations; taxes; economic comparison of alternatives; economic optimization. [0-0-0; 3-0-0]

362. (1) *Chemical Engineering Laboratory II.*—Experiments to illustrate and use material presented in courses CHML 345, 351, 353, and STAT 251. Novel experiments. Field trips may be required. [0-3-0; 0-0-0]

363. (1) *Chemical Engineering Laboratory III.*—Experiments to illustrate and use material presented in 300-level CHML courses. Novel experiments. Field trips may be required. [0-0-0; 0-3-0]

450. (2) *Diffusional Operations.*—Principles of mass-transfer operations including absorption, distillation, humidification, extraction, drying, and adsorption. [2-0-2*; 2-0-2*]

453. (2) *Economics of Plant Design.*—Economics of chemical engineering processes; optimisation of operating conditions; choice of auxiliary equipment. Exercises in plant design. [2-0-0; 2-0-0]

454. (3) *Process Design Project.*—The design and economic assessment of a major chemical engineering process. A directed-study type course in which the students use previous course material in the synthesis of a detailed design of a practical process. Contact hours are used for the presentation of progress reports and consultation with faculty and industrial advisers. [0-0-2; 0-0-2]

455. (3) *Chemical Engineering Reactor Design.*—Chemical reaction kinetics, catalytic processes, and reactor design. [2-0-0; 2-4-0]

458. (1) *Properties of Fluids.*—Prediction of Thermodynamic and transport properties of fluids. Behaviour of single and multi-phase systems. [2-0-0; 0-0-0]

460. (2) *Chemical Engineering Laboratory.*—Experiments in unit operations, instrumentation, and other topics. Field trips to various industries are required as part of this course. Expenses are the responsibility of the student. [0-6-0; 0-6*-0]

470. (1) *Chemical Pulping Technology.*—Pulp processing with emphasis on topics related to chemical engineering, including wood chemistry, chemical pulping, chemical recovery, bleaching, chemical by-products and pollution. [2-0-0; 0-0-0]

471. (1) *Mechanical Pulping and Papermaking Technology.*—Pulp and paper processing with emphasis on topics of general engineering interest, including mechanical pulping, stock preparation, papermaking, fibre and paper properties, energy, and project engineering. [0-0-0; 2-0-0]

472. (1) *Hydrocarbon Processing.*—Conversion of hydrocarbons such as natural gas, crude petroleum and tar sands into fuels and chemical feedstocks. Topics include distillation of complex hydrocarbon mixtures, cracking, hydrotreating, reforming, alkylation and gas sweetening. Restricted to fourth year chemical engineering students or by permission of the instructor. [0-0-0; 2-0-0]

473. (1) *Water Pollution Control.*—Legal, environmental and physicochemical aspects of industrial water pollution and its abatement will be surveyed. Current wastewater treatment processes and their industrial application will be discussed. [2-0-0; 0-0-0]

475. (2) *Process Control.*—Theory and design of control schemes for complex chemical plants; introduction to computer and optimal control of chemical processes. Prerequisite: CHML 356 or equivalent. [2-1-0; 2-1-0]

476. (1) *Modelling and Optimization in Chemical Engineering.*—Mathematical modelling of chemical plants and processes. Computer simulation. Introduction to numerical optimization techniques. [0-2-0; 0-0-0]

477. (1) *Electrochemical Engineering.*—Introduction to thermodynamics and kinetics of electrode processes; conduction in liquids and multiphase systems; current distribution; electrochemical reactor design; plant layout; electrochemical process technology. Restricted to fourth year chemical or metallurgical engineering students; or by permission of the instructor. [2-0-0; 0-0-0]

478. (1) *Energy and Fuels.*—Basic considerations in the supply and use of fuels. Combustion, gasification, carbonisation and solvent refining. Energy conservation, description, theory and problem material. This course is the same as METL 464. [2-0-0; 0-0-0]

479. (1) *Chemical Engineering Aspects of Occupational Health and Safety.*—Relationship between current engineering practice and worker health and safety. Engineering analysis of industrial health and safety problems. [0-0-0, 2-0-0]

498. (1½) *Summer Essay or Engineering Report.*—This should be written on some subject of scientific or technical interest, based preferably on personal experience. Specifications are issued by the Department at the end of Third Year. Deadline for submission: September 15.

499. (4) *Thesis.*—Research or design project under the direction of a staff member. [0-4-0; 0-8-0]

550. (1-2)**d** *Industrial Kinetics.*—Topics will vary from year to year and may include chemical reaction kinetics, catalytic processes, heterogeneous and homogeneous reactions, heat and mass transfer in industrial reactors; design of catalytic and non-catalytic reactors.

551. (1-2)**d** *Chemical Engineering Thermodynamics.*—Pressure-volume-temperature relations; chemical equilibria by Gibbs' method; vapor-liquid equilibria; thermodynamic calculations by third law and quantum-statistical methods, irreversible thermodynamics and information theory.

552. (1-2)**d** *Optimization Methods.*—Mathematical and experimental techniques for optimizing processes. Course content will vary from year to year, but will be chosen from: direct search techniques, unconstrained optimization, Jacobian and Lagrangian optimization, mathematical programming, and variational calculus techniques.

553. (1-2)**d** *Mathematical Operations in Chemical Engineering.*—Topics vary from year to year. Amongst these will be dimensional analysis and model theory; treatment and interpretation of chemical engineering data; formulation and solution of differential and finite difference equations; graphical, numerical and statistical methods.

554. (1-2)**d** *Momentum, Heat and Mass Transfer.*—Prediction of velocity, temperature, and concentration profiles for flowing fluids; unifying concepts and analogies in momentum, heat, and mass transport; streamline flow and turbulence, molecular and eddy conduction and diffusion, boundary layers, smooth and rough conduits and other boundaries.

555. (1-2)**d** *Solvent Extraction and Gas Absorption.*—Mass transfer in liquid-liquid and gas-liquid systems. Design of extraction and absorption columns. Gas-liquid and liquid-liquid equilibria.

556. (1-2)**d** *Distillation.*—Systems of complete and limited miscibility; multicomponent systems; graphical and analytical design methods; azeotropic and extractive distillation.

557. (1-2)**d** *Fluid Dynamics.*—Topics include tensor analysis; governing equations for Newtonian fluids, exact and numerical solutions to Navier-Stokes equations; creeping flow; flow through porous media; incompressible boundary layers; stability analysis; turbulence.

558. (1-2)**d** *Process Heat Transfer.*—Steady state and transient state studies; calculation and design of industrial heat exchangers.

559. (1-3)**d** *Topics in Chemical Engineering.*—A discussion of some aspects of modern Chemical Engineering. Subject matter varies each year.

560. (1-3)**d** *Biochemical Engineering.*—Kinetics of growth and of biological reactions; principles of agitation; aeration; sterile techniques; product recovery operations; survey of industrial fermentations.

561. (1-2)**d** *Particulate and Multiphase Systems.*—Topics vary from year to year and include electrokinetic colloidal phenomena; packed beds; filtration; sedimentation; two- and three-phase fluidized beds; spouted beds; hydraulic and pneumatic transport; gas, liquid and solid particle mechanics; multiphase flows.

562. (1-3)**c** *Advanced Process Design Project.*—Design and economic assessment of a chemical engineering process using computer modelling and optimization techniques. A directed-study course in which students make use of computational methods to aid in the design of practical processes of industrial significance, and to evaluate design alternates. Prerequisites: CHML 476 and/or CHML 552 or equivalent (may be taken concurrently with the permission of the instructor).

565. (1-3)**d** *Process Control.*—Theory and design of control schemes for complex chemical plants; introduction to computer and optimal control of chemical processes; experimental projects involving digital computer control of a laboratory reactor.

571. (1-3)**d** *Non-Newtonian Fluid Behaviour.*—Selections from the following topics: kinematics of deformation and flow, dynamics of continuous media, constitutive equations, physical chemical and molecular aspects of viscosity, engineering applications to pipe flow, mixing, heat transfer. Handling of suspensions and polymers.

572. (1-3)**d** *Water Pollution Control.*—Water pollution control; methods of problem assessment from chemical operations, technology of control with special attention to regional problems. Emphasis varies from year to year with emphasis on industrial problems.

573. (1-2)**d** *Less Common Separation Methods.*—New processes, or developments in existing specialized separation methods. Topics vary from year to year and may include advances in chromatographic and absorption processes, cyclic operations such as parametric pumping, membrane separation processes, and interface concentration methods.

574. (1-2)**d** *Equilibrium Properties of Non-Ideal Mixtures*.—Discussion of various methods of calculating vapor-liquid, liquid-liquid equilibrium and thermal properties, including molecular thermodynamics. Excess free-energy of mixing. Thermodynamic consistency tests. Emphasis on engineering applications and newer approaches.

575. (1-2)**d** *Air Pollution Control*.—Characteristics of various air pollutants, their behaviour in the atmosphere, monitoring problems, technology of particle collection and control of pollutant gases. Particular problems of regional interest are discussed.

576. (1-2)**d** *Air Pollution Projects*.—Advanced study and design projects dealing with specific problems in air pollution control. Prerequisite: CHML 575 or equivalent, or permission of instructor.

577. (1-2)**d** *Electrochemical Engineering*.—Thermodynamics and kinetics of electrode processes; mass transfer in electrolytes; current distribution and scale-up problems; electrochemical reactor design. Applications from inorganic, organic and metallurgical processes and fuel cell development.

578. (1-2)**d** *Coal Utilization*.—Properties affecting utilization of coal; coal combustion; conversion of coal to gaseous, liquid and solid fuels; heterogeneous reactions and chemical kinetics in coal conversion processes; reactor design and modeling of coal combustion, gasification and liquefaction processes; coal as a feedstock for chemicals; environmental aspects of coal conversion processes.

580. (1) *Pulping Processes*.—Mechanical pulping theory and practice; groundwood, refiner, TMP; chemistry of major chemical pulping processes; chip quality, digester design and control; testing and evaluation of pulps.

581. (1) *Pulping Recovery Engineering*.—Sodium cycle: oxidation of black liquor, evaporation theory and practice, black liquor burning. Calcium cycle: lime kiln; slaking; recausticization; mud washing. Sulphite recovery processes.

582. (1) *Bleaching Process Engineering*.—Chemistry of bleaching; chlorination, oxidation; extraction; bleaching sequences; washing; control of bleaching; chlorine dioxide generation; alternative processes, e.g. oxygen bleaching, peroxide bleaching and brightening.

583. (1) *Pulp Properties and Processing*.—Fibre and pulp properties; blending and mixing; beating and refining; screening and cleaning; consistency control.

584. (1) *Papermaking Operations*.—Flow distribution to papermachine headboxes; drainage; pressing; drying; calendering; winding; finishing; coating; paper making chemistry.

585. (1) *Rheology of Pulp and Paper*.—Flocculation; flow of pulp suspensions; wet web properties; paper structure; strength and optical properties of paper; paper printability.

586. (1) *Pulping Technology Laboratory*.—Cooking of chips in pilot digester under various controlled conditions; evaluation of pulp; pulp bleaching; pulp washing.

587. (1) *Paper Technology Laboratory*.—Pulp disintegration; flow of pulp suspensions; handsheet making; pressing; drying; paper testing.

596. (0) *Engineering Report*.—Engineering report of at least 3000 words on a research or design topic under the supervision of a faculty member.

597. (3) *Project*.—Project report on assigned topic including literature search, evaluation, and report; mill visit to complete data book.

598. *Seminar*.—Presentation and discussion of current topics in chemical engineering research. A required course for graduate students in Chemical Engineering which carries no academic credit.

599. (6) *Thesis*.—For M.A.Sc. degree.

699. *Thesis*.—For Ph.D. degree.

Chemistry (Faculty of Science)

Note: Chemistry 110 or 120 is the normal prerequisite for admission to science programs and to the Faculty of Applied Science. Both courses require Mathematics 100 and 101 or Mathematics 120 and 121 plus a first year Physics course as corequisites. Chemistry 103 is NOT appropriate for students in Faculty of Science programs or those planning to enter the Faculty of Applied Science.

Chemistry 110 is open to students who have obtained credit for Chemistry 11 whereas Chemistry 120 is open to students with credit for Chemistry 12. Chemistry 103 is open to students from other Faculties with either Chemistry 11 or 12 credit.

**For students in the Faculty of Applied Science.*

**Additional fees are charged for these courses. See "Special Fees" P. 22.

**103. (3) *General Chemistry*.—A study of the fundamental principles of chemistry including the molecular structures of both inorganic and organic compounds. Not for credit in Faculty of Science programs. Space is limited; students may experience difficulty enrolling in this course. Prerequisites: Mathematics 12 or Algebra 12 (or Mathematics 111 or 130 concurrently); Chemistry 11 and Physics 11 or their equivalents are recommended. [3-3; 3-3]

**110. (3) *Principles of Chemistry*.—A study of the fundamental principles of chemistry with particular reference to the nature of solutions, the solid state and the molecular structure of both inorganic and organic substances. This course is intended for prospective Science and Engineering students who have not taken Chemistry 12. This course is not open to students with credit for Chemistry 12. This course is of equivalent standard to Chemistry 120, recognized for credit in all programs requiring a first year Chemistry course but designed for students with a deficient background in Chemistry. Prerequisites: Chemistry 11, Physics 11. Mathematics 100 and 101 (or 120 and 121) and a first year physics course must precede or be taken concurrently. [3-3-1; 3-3-1]

**120. (3) *Principles of Chemistry*.—Similar to Chemistry 110 but the subject matter is treated in somewhat more detail. This course is intended for those prospective Science and Engineering students who have taken Chemistry 12. Prerequisites: Chemistry 11 and 12, Physics 11. Mathematics 100 and 101 (or 120 and 121) and a first year physics course must precede or be taken concurrently. [2-3-1; 2-3-1]

* **150. (2) *Engineering Chemistry*.—Atomic and molecular structure; solid state chemistry; organic chemistry; chemical thermodynamics; chemical equilibrium; electrolyte and non-electrolyte solutions; electrochemistry. Prerequisite: Chemistry 12. [4-3*-1.5*; 0-0-0] or [0-0-0; 4-3*-1.5*]

**201. (1½) *Introduction to Physical and Analytical Chemistry*.—Introductory chemical kinetics and reaction mechanisms. Principles of chemical thermodynamics. The laboratory will illustrate physical chemistry principles and include some experience with analytical chemistry techniques. This course is suitable for Honours students in all B.Sc. programs and for students in Major Chemistry or Biochemistry programs. Prerequisite: Chemistry 110 or 120. Mathematics 200 concurrently is recommended. [2-4-1; 0-0-0]

**202. (1½) *Inorganic and Analytical Chemistry*.—Structure and reactivity of coordination compounds of the transition elements. The laboratory supplements the lecture material and includes experiments in quantitative chemical analysis. This course is suitable for Honours students in all B.Sc. programs and for students in Major Chemistry or Biochemistry programs. Prerequisite: Chemistry 110 or 120. [0-0-0; 2-4-1]

**203. (3) *Organic Chemistry*.—Fundamental principles of the chemistry of aliphatic, aromatic, alicyclic and heterocyclic organic compounds. This course is only for prospective Honours (or major) students in science. Prerequisites: Chemistry 110 or 120 and permission of the Head of the Department. [3-3; 3-3]

**205. (3) *Physical, Inorganic and Analytical Chemistry*.—Systematic inorganic chemistry, properties of matter from a molecular standpoint, equilibria in solution, physical chemistry useful in biological, medical, agricultural, and related sciences. This course is not intended for Honours or Major in Chemistry. Prerequisite: Chemistry 110 or 120 (or 103 with standing of 65%). Credit will be given for only one of Chemistry 201 and 202; or 205 or 208. [3-4; 3-4]

**208. (3) *Physical and Inorganic Coordination Chemistry*.—Basic thermodynamics and kinetics, solution and phase equilibria, phase rule, thermochemistry. Inorganic crystal and coordination chemistry. This course is intended for students in geological, metallurgical and related sciences and is not intended for Honours or Major in Chemistry. Prerequisite: Chemistry 110 or 120 (or 103 with Standing of 65%). Credit will be given for only one of Chemistry 201 and 202; or 208 or 205. [3-4; 3-4]

**230. (3) *Organic Chemistry*.—The fundamental principles of modern organic chemistry including a discussion of the main classes of organic compounds. Prerequisite: Chemistry 103, 110 or 120. Credit will not be given for both Chemistry 203 and 230. [3-3; 3-3]

*250. (1) *Inorganic Chemistry*.—Chemistry of selected groups of inorganic compounds, considered in relation to industrial processes. Prerequisite: Chemistry 251 or equivalent. [0-0-0; 2-0-0]

*251. (1½) *Physical Chemistry I*.—Principles of thermodynamics; chemical equilibrium; non-electrolyte solutions; phase equilibria; surface chemistry. Prerequisite: Chemistry 150 or 120 or 110. Credit will not be given for both Chemistry 251 and 262. [3-0-1*; 0-0-0]

*252. (1) *Physical Chemistry II*.—Chemical kinetics and catalysis; electrical phenomena at interfaces and irreversible electrode processes. Prerequisite: Chemistry 251. [0-0-0; 2-0-1*]

* **255. (1) *Chemistry Laboratory*.—An integrated laboratory course designed to illustrate the principles of physical, organic and inorganic chemistry. Corequisite: Chemistry 250, 251, 252 and 260. [0-4-0; 0-4-0]

*260. (2) *Organic Chemistry for Engineers*.—A description of the properties and reactions of organic compounds with emphasis on compounds and reactions of industrial importance. [2-0-0; 2-0-0]

*262. (1½) *Physical Chemistry of Surfaces*.—Thermodynamic principles; interfacial energetics and thermodynamics; Eh-pH diagrams; reactions at liquid-solid interfaces and corrosion; interfacial electrochemistry, electrical double layer and the zeta potential; surfactants; stability and rheology of colloids and suspensions. Prerequities: Chemistry 150 or 120 or 110. Credit will not be given for both Chemistry 262 and 251. [0-0-0; 3-0-0]

301. (1½) *Aqueous Environmental Chemistry*.—Introduction to properties and composition of, and equilibria in, natural waters, including gas and solid equilibria, pH, redox, complexation analysis, corrosion treatment, ion exchange, colloids and microbial transformations of organic and inorganic materials. Prerequisite: Chemistry 110 or 120. [3-0-0; 0-0-0]

302. (1½) *Atmospheric Environmental Chemistry*.—Introduction to structure, composition and chemical processes occurring in Earth's atmosphere, including interactions with solar radiation, stratospheric ozone layer, photochemical smog and acid rain. Prerequisite: Chemistry 110 or 120. Chemistry 201 recommended. [0-0-0; 3-0-0]

**304. (3) *Physical Chemistry*.—Diffusion phenomena; ionic mobility; fundamental theories and selected applications of chemical kinetics; introduction to the thermodynamics of multicomponent systems; phase equilibria, colligative properties and surface phenomena. Prerequisite: Mathematics 200 and Chemistry 201 (or 205 with permission). [2-4*-2*; 2-4*-2*]

**305. (3) *Physical Chemistry for Biologists*.—Elementary thermodynamics, thermochemistry, and electrochemistry; chemical equilibria; chemical reaction rates, especially enzyme kinetics and fast reaction techniques; colloid science, diffusion phenomena; methods for determining molecular weight, size, and shape of macromolecules in solution. Prerequisite: Chemistry 201 and 202; or 205. Mathematics 200 is strongly recommended. [3-4*-2*; 3-4*-2*]

306. (1) *Diffraction Methods*.—Crystal structures; point and space groups; X-ray diffraction, neutron diffraction, electron diffraction of gases and surfaces. Prerequisite: at least 1½ units of second year Chemistry. [2-0-0; 0-0-0]

**310. (3) *Inorganic Chemistry*.—A systematic treatment of the chemistry of the elements based on the periodic classification, interpreted in terms of structure, mechanism, and theoretical principles. Prerequisite: Chemistry 202 or, with permission, 205. Credit will not be given for both Chemistry 310 and 335. [2-4*-1; 2-4*-1]

**311. (2) *Instrumental Analysis*.—An introduction to instrumental methods of chemical analysis including electrochemical methods, spectroscopic methods, mass spectrometry, radiochemical methods and chromatography. Prerequisite: Chemistry 201 and 202 (or 205 or 208), or permission of Head of Department. [2-4*-0; 1-4*-0]

312. (2) *Introduction to Quantum Chemistry and Spectroscopy*.—Introduction to wave and matrix mechanics; angular momentum, magnetic resonance; rotational, vibrational and electronic spectroscopy, and their use in determining molecular structure. Prerequisite: Chemistry 201 and 202, and Mathematics 221. [2-0-1; 2-0-1]

**313. (3) *Advanced Organic Chemistry for the Life Sciences*.—A description of the functional chemistry of organic substances that have particular relevance to the life sciences. Prerequisites: Chemistry 230 or 203. Credit will be given for only one of Chemistry 303, 313 and 330. [3-4; 3-4]

**330. (3) *Advanced Organic Chemistry*.—A discussion of organic reactions that are met in various natural and industrial processes. Laboratory work: qualitative organic analysis and techniques of organic synthesis. Prerequisite: Chemistry 230 (or 203). Credit will be given for only one of Chemistry 303, 313 and 330. [3-4; 3-4]

**335. (3) *Introduction to Bio-Inorganic Chemistry*.—A treatment of those parts of inorganic chemistry which are of especial importance to living systems, together with the physicochemical methods used in their investigation. Prerequisite: Chemistry 203 (or 230) and 201 and 202 (or 205). Credit will not be given for both Chemistry 310 and 335. [2-4*-1; 2-4*-1]

***352. (2) *Modern Analytical Methods*.—An introduction to modern methods of analysis including optical, electrochemical and radiochemical methods, mass spectrometry, magnetic resonance spectrometry and chromatography. [2-0-0; 0-4-0]

401. (1½) *Quantum Chemistry*.—Introduction to atomic and molecular wave functions. Hückel molecular orbital theory. Introduction to ligand field theory. Elementary group theory. Prerequisite: Chemistry 312. [2-0-1; 0-0-0]

404. (1½) *Advanced Inorganic Chemistry*.—Structure, reactivity and bonding of compounds containing homonuclear bonds; cluster chemistry of both main group and transition elements. Chemistry of non-acqueous solvents. [2-0-1; 0-0-0]

405. (1) *Biophysical Chemistry*.—A survey of techniques and systems with emphasis on the basic physical chemistry involved in the study of macromolecules. Prerequisite: Chemistry 203 (or 230) and 304 (or 305). [0-0; 2-0]

406. (1) *Polymer Chemistry*.—Structure and availability of monomers; Propagation mechanisms; synthesis of polymers with predetermined properties; measurement and interpretation of physical properties of polymers. Prerequisite: Chemistry 203 (or 230), and 304 (or 305). [2-0; 0-0]

407. (1½) *Applied Physical Chemistry*.—Electrolytes; colloids; membrane phenomena; electrokinetic phenomena; light scattering; physical properties of polymers and rubber. Introduction to statistical thermodynamics. Prerequisite: Chemistry 304. [2-0-1; 0-0-0]

408. (1) *Chemical Dynamics*.—Fast reactions; photochemistry and radiation chemistry; homogeneous and heterogeneous catalysis. Prerequisite: Chemistry 304. [0-0; 2-0]

410. (1) *Physical Chemistry of the Solid State*.—Introduction to the theory of electrons in solids; bands and zones. Absorption of light and excitons. Vacancies, interstitials, electronic defects and dislocations with particular reference to the roles of these types of defects in chemical reactivity. Prerequisite: Chemistry 201 and 202. [0-0; 2-0]

411. (1½) *Synthesis and Chemistry of Natural Products*.—A discussion of synthetic methods and their application to natural products, particularly in the areas of alkaloids, steroids and terpenes. Prerequisite: Chemistry 303 or 330 or 313. [2-0-1; 0-0-0]

412. (1) *Industrial Organic Chemistry*.—The production and use of primary petrochemicals; plastics and synthetic fibres; pharmaceutical agents; insecticides, herbicides and insect pheromones, dyes, detergents, perfumes and flavours; commercially important microbial transformations. Prerequisite: Chemistry 203 or 230 or 260. [2-0-0; 0-0-0]

413. (1) *Bio-Organic Chemistry*.—A discussion of the chemistry of carbohydrates, amino acids, proteins, and biologically important heterocyclic systems. An introduction to the biosynthesis of major groups of natural products. Prerequisite: Chemistry 303 or 330 or 313 (or 313 concurrently). [0-0; 2-0]

414. (1½) *Coordination Chemistry*.—The bonding, stability and stereochemistry of coordination compounds, and the mechanisms of their reactions. Prerequisite: Chemistry 310 or 335 (401 recommended). [0-0-0; 2-0-1]

415. (1-2)c** *Practical Chemistry Laboratory*.—Integrated laboratory course designed to illustrate principles of modern analytical, inorganic, organic and physical chemistry. Prerequisite: permission of the Head of the Department. Students in Chemistry Honours must register for 2 units. Students in Chemistry Major must register for at least 1 unit, specifically in areas of analytical and inorganic chemistry. For a full two units, eight hours of laboratory per week are required. [0-8-0; 0-8-0]

416. (1½) *Physical and Theoretical Organic Chemistry*.—Substituent effects, solvent effects, energetics and catalysis in organic reactions. Pericyclic reactions. Prerequisite: Chemistry 313 or 330. [0-0-0; 2-0-1]

417. (1½) *Nuclear Chemistry and Radiochemistry*.—An introductory course. Basic treatment of the nucleus, with analogy to concepts in chemistry. Nuclear stabilities and associated radioactive decay processes. Nuclear structure. Applications of radioisotopes in chemistry. The interaction of radiation with matter. Prerequisite: Chemistry 201 and 202 (or with permission 205). [0-0-0; 2-0-1]

418. (1) *Organometallic Chemistry*.—The chemistry of compounds containing organic groups directly bonded to metals and metalloids. Emphasis will be placed on the structure and bonding of the compounds and their use in synthetic chemistry. Prerequisite: Chemistry 310. [0-0; 2-0]

420. (1½) *Molecular Spectroscopy*.—A detailed study of rotational, vibrational and electronic spectroscopy. Prerequisite: Chemistry 401. [0-0-0; 2-0-1]

**421. (1) *Advanced Instrumental Analysis Laboratory*.—A laboratory course concerned with the application of instrumental methods to the analysis of natural substances and industrial products. Prerequisite: Chemistry 311 or permission of the Head of the Department. [0-4; 0-4]

430. (1½/3)**d** *Developments in Contemporary Chemistry*.—A review of modern developments in general chemistry to provide teachers of Secondary School chemistry with background material for their courses. The laboratory exercises are designed to supplement the lecture material. (Not for credit in the Faculty of Science.) Course is offered periodically in extra-sessional Winter and Summer sessions.

435. (1) *Bio-Inorganic Chemistry*.—A discussion of the involvement of inorganic chemistry in biological systems. Chemistry of cations, metalloenzymes, and simpler model systems. Reactions of coordinated ligands, Chemistry of sulphur and phosphorus. Prerequisite: Chemistry 310 (or 335), and 304 (or 305). [0-0; 2-0]

449. (3) *Seminar and Thesis*.—All Honours students are required to take this course which consists of a weekly seminar dealing with developments in modern chemical science not normally covered in other lecture courses. In addition, each student is required to undertake original research work on a problem of current chemical interest under the direction of a faculty member. Major students who have satisfactory academic standing may be permitted to enrol in this course after receiving the permission of the Head of the Department. [1-6; 1-6]

500. (3) *Introductory Quantum Chemistry*.—Basics of quantum mechanics, including the solution of phenomenological problems by matrix methods; perturbation theory. Quantum chemistry of atoms and molecules: molecular properties, many electron wave functions, semiempirical methods. Time dependent phenomena, scattering theory.

502. (3) *Advanced Physical Chemistry*.—Examples of diffusion phenomena and their theoretical description. Equilibrium statistics and their application to macroscopic phenomena. Theory of relaxation and its application to radiative and non-radiative processes.

505. (1½/3)**d** *Topics in Theoretical Chemistry*.

506. (1½/3)**d** *Topics in Statistical Mechanics*.

507. (1½/3)**d** *Topics in Physical Chemistry*.

508. (1½) *Chemical Kinetics*.—Types of reactions, kinetic theory, energy transfer processes, transition state theory, chain reactions, reactions in solution, heterogeneous processes.

509. (1½) *Electron and Photon Impact Phenomena*.—Basic aspects of collision phenomena. Mass spectroscopy, u.v. and X-ray photoelectron spectroscopy, Auger spectroscopy, electron scattering, electron impact spectroscopy, breakdown of molecules under particle and photon impact, Penning ionization.

511. (1½) *Nuclear Chemistry*.—Nuclear rotational and vibrational structure, angular correlation theory, nuclear reactions and scattering theory, nuclear synthesis and trans-uranic elements, mesonic atoms and molecules, muonium chemistry.

512. (1½) *Radiation Chemistry*.—The study of the interactions of ionizing radiations (and high energy particles) with matter to produce physical, chemical and biological changes, including a discussion of solvated electrons.

513. (1½) *Surface Chemistry*.—Chemistry of the solid-gas interface: Modern methods for investigation of the structure of solid surfaces and interactions between solid surfaces and gases. Theory of adsorption, surface reactivity and heterogeneous catalysis.

514. (1½) *Crystal Structures*.—Crystal structures and structural analysis by the methods of X-ray diffraction and neutron diffraction.

515. (1½) *Photochemistry*.—The primary photochemical process, including photodissociation, photoisomerization, fluorescence and phosphorescence; energy transfer processes; recent advances in the mechanisms of both steady state and flash photochemical reactions.

516. (1½/3)**d** *Topics in Biophysical Chemistry*.

518. (1½/3)**d** *Topics in Magnetic Resonance*.

519. (1½/3)**d** *Topics in Molecular Spectroscopy*.

520. (3) *Advanced Inorganic Chemistry*.—Synthesis of important classes of inorganic compounds, energetics and structure as guides to main group chemistry, reaction pathways in coordination and organometallic chemistry, and the donor-acceptor concept in coordination chemistry and solution chemistry.

521. (1½/3)**d** *Topics in Inorganic Chemistry*.

522. (1½) *Inorganic Reaction Mechanisms*.—Substitution reactions and electron transfer processes in inorganic and organometallic chemistry. Catalytic processes involving metal hydrides, carbonyls, and organometallics. Proton transfer reactions. Photochemical reactions of metal complexes.

524. (1½) *Chemistry of Organometallic Compounds*.—The preparation, properties and structures of organic derivatives of metals and metalloids.

526. (1½) *Bioinorganic Chemistry*.—Inorganic aspects of biological chemistry; emphasis on the role of metal ions and metalloenzymes.

530. (3) *Advanced Analytical Chemistry*.—Survey topics from the four main branches of analytical chemistry: classical methods; electrochemistry; separations; spectroscopic analysis.

531. (1½) *Analytical Spectroscopy*.—Fundamental and practical aspects of optical methods for atomic and molecular analysis: frequency and intensity measurements; absorption, fluorescence, and emission techniques and instrumentation.

532. (3) *Physical and Analytical Techniques of Modern Chemistry*.—Spectroscopic methods and material separation techniques used in isolation, analysis and structural characterization of chemical compounds.

540. (1½) *Seminar in Chemistry*.—This course is compulsory for all graduate students in Chemistry.

542. (1½) *Seminar in Special Topic*.—A seminar course dealing with recent developments in the student's special field of Chemical Science. Not open to students in their first year of graduate study.

548. (0) *Research Conference*.—Attendance is compulsory for all graduate students in each year of registration for the M.Sc. or Ph.D. in chemistry. No unit value.

549. (9) *M.Sc. Thesis*.

560. (3) *Organic Chemistry*.—Fundamentals of organic stereochemistry, stereoelectronic control and conformational analysis. Factors governing the formation and opening of rings by pericyclic and other processes. Fundamentals of organic photochemistry.

563. (1½) *Advanced Physical Organic Chemistry*.—Discussion of acidity functions, photochemistry and reactive intermediates in organic chemistry. Applications of molecular orbital theory to organic systems.

566. (1½) *Advanced Organic Synthesis*.—Discussion of modern synthetic methods and applications to the synthesis of complex organic molecules.

567. (1½) *Heterocyclic Chemistry*.—The synthesis, reactions and properties of the principal families of heterocyclic compounds.

568. (1½/3)**d** *Topics in Natural Products Chemistry*.

570. (1½) *Carbohydrates*.—Synthesis, reactions and chemical properties of mono- and oligosaccharides; applications of these concepts to the study of polysaccharide structures.

573. (1½) *Application of Spectroscopy to Organic Structural Problems*.—A problem solving course to illustrate the application of n.m.r., mass spectrometry, ORD, CD, etc. to elucidation of structures of organic and organometallic compounds. Would normally be preceded by Chemistry 532.

649. *Ph.D. Thesis*.

Chinese—See Asian Studies.

Civil Engineering (Faculty of Applied Science)

205. (1½) *Municipal Water Supply and Waste Disposal*.—The engineering aspects of providing a community with an adequate water supply, collecting stormwater, collecting and disposing of sewage, and managing its solid wastes. Emphasis will be placed on practical aspects of the problems facing Western Canada as well as the hydraulic requirements for the in-ground pipe systems. Prerequisite: CIVL 215 or equivalent. [0-0-0; 3-0-2]

215. (1½) *Fluid Mechanics*.—Fluid properties, hydrostatics, kinematics, and fluid dynamics: energy and momentum methods with applications. Dimensional analysis modelling, introduction to flow in pipes and forces on immersed objects. Prerequisites: 1st year calculus & physics. [3-0-2; 0-0-0]

220. (1½) *Civil Engineering Materials I*.—Simple physical aspects of materials; structure of materials; mechanical properties of materials; test methods for determining mechanical properties. The emphasis of this course will be on the relationship between the structure of materials and their mechanical properties. Attention will also be focussed on the experimental problem involved in determining mechanical properties. [0-0-0; 3-2-0]

225. (1½) *Computer Applications in Civil Engineering*.—Introduction to computer graphics, interactive programming and use of numerical algorithms. Use of micro-computers, typical operating systems and languages, peripherals. Laboratory to provide practical experience with various systems and devices. Civil Engineering applications emphasized. Prerequisite: CPSC 114. [0-0-0; 1-3-0]

230. (1½) *Solid Mechanics I*.—An introductory course dealing with elementary relations existing between external forces and deformations, stress and strain: review of statics; beam faces, shear and moment diagrams; definitions of stress and strain; constitutive relations; stresses in elementary rods, shafts, beams and tanks; Mohr's circle; deformations of beams and shafts; introduction to indeterminate structures. Prerequisite: PHYS 170, MATH 154 [3-0-2; 0-0-0]

231. (1½) *Solid Mechanics II*.—A continuation of CIVL 230 with emphasis on beams and columns: determinate and indeterminate beam deformations; unsymmetrical bending; principal moments of inertia; shear flow in thin walled open sections; shear centres; torsion of open and closed sections; buckling; beam-columns. Prerequisite: CIVL 231. [0-0-0; 3-0-2*]

232. (1½) *Dynamics II*.—Plane motion of rigid bodies; absolute and relative velocity and accelerations, rotating reference frames, Coriolis acceleration; Kinetics of systems of rigid bodies, energy and momentum methods. Introduction to vibration theory, single and multi-degree of freedom systems, matrix representation. Prerequisites: PHYS 170 and PHYS 175. [3-0-1; 0-0-0]

235. (2) *Plane Surveying*.—Theory and application of plane surveying methods. Introduction to and use of compass, transit, tape, level and plane table. Construction and topographic surveys. Reduction of field data. Compilation of maps and drawings from notes and calculations. The course commences immediately after spring examinations and continues full time for two weeks. Information on the exact dates, and registration forms, will be available in the Civil Engineering Office following publication of the final Examination Timetable.

300. (1½) *Engineering Economic Analysis*.—Cost concepts; time value of money operations; comparison of alternatives; depreciation and taxes; economic analyses of projects in the public sector; break-even sensitivity and risk analysis; decision models. Prerequisite: 3rd Year standing. [3-2*-0; 0-0-0]

301. (1½) *Optimization and Decision Analysis in Civil Engineering*.—An introduction to the application of systems engineering, optimization, and applied probability to the design and operation of civil engineering systems. Prerequisites: CIVL 225, MATH 251. [0-0-0; 3-0-0]

310. (1½) *Soil Mechanics I*.—Origin, nature and composition of soils; phase relationships; grain shape, mineral composition and size distribution; soil structure; plasticity of fine grained soils; field identification and classification; compaction; permeability, capillary phenomena and frost heave; analysis of seepage in one and two dimensional flow nets; principle of effective stress; stress distribution soil masses; Terzaghi's one dimensional consolidation theory; primary, and secondary consolidation; settlement analysis. Prerequisites: CIVL 231. Corerequisite: GEOL 150. [3-2*-0; 0-0-0]

311. (1½) *Soil Mechanics II*.—Laboratory and field measurement of sheer strength — direct shear, triaxial compression, vane sheer and standard penetration tests; shear strength characteristics of cohesionless and cohesive soils: drained and undrained strengths, critical void ratio, pore pressure parameters A and B; long term and short term stability problems; application of shear strength in theories of lateral earth pressure and bearing capacity; introduction to design of shallow and deep foundations and analysis of slope stability. Prerequisite: CIVL 310. [0-0-0; 3-2*-0]

315. (1½) *Hyrdaulics I*.—Two dimensional flow around immersed objects; velocity and pressure fields, cavitation; lift and drag on cylinders and aerofoils; unsteady flow in pipes; frictionless waterhammer analysis; control of waterhammer; surge tank analysis; and application to pipeline systems design for pumps and turbines. Prerequisites: CIVL 215, Mathematics to include partial differential equations; ability to use computer. [2-2*-1; 0-0-0]

316. (1½) *Hydraulics II*.—Steady open channel flow in rectangular sections; application of energy and momentum principles; non-uniform steady flow in open channels; lake discharge and control sections; unsteady open flow, frictionless theory; elementary gravity wave theory; falling and rising tides in estuaries; applications to sluice gate operations, pumps in channels, dam burst; kinematic waves; hydrologic routing; and illustrative use of hydraulic models. Prerequisite: CIVL 315. [0-0-0; 2-2*-1]

320. (1½) *Civil Engineering Materials II*.—The structure and properties of common Civil Engineering materials: aggregates, portland cement, concrete, asphalt cement and concrete, timber, metals and ceramics. The emphasis will be on the mechanical properties of these materials, and their behaviour under various loading and environmental conditions. Prerequisite: CIVL 220 or equivalent. [3-2*-0; 0-0-0]

321. (1) *Laboratory Project in Engineering Materials*.—An experimental investigation of any material property of interest. Students in groups of 2-4 will be expected to define a materials problem, develop a means of studying the problem experimentally, carry out the experiment, and write a formal report. Each group will be supervised individually by a member of faculty. Prerequisite: CIVL 320. [0-0-0; 1-2-0]

330. (1½) *Structural Design I*.—Concept of design, safety, codes, loads, general material properties. Design of tension members and beams in steel, concrete and timber. Prerequisites: CIVL 220, 231. [0-0-0; 3-0-2*]

332. (1½) *Structural Anaylsis I*.—Introduction to indeterminate structural analysis methods: plane and space trusses, plane frames; slope deflection and moment distribution; virtual work and energy methods; direct stiffness method. Prerequisites: CIVL 231, MATH 152. [3-0-0; 0-0-0]

333. (1½) *Structural Analysis II*.—Column and frame buckling using energy methods; computer application of matrix stiffness method; analysis and response of various types of structures; shear deformation; stability functions. Prerequisite: CIVL 332. [0-0-0; 3-0-0]

336. (2) *Applied Plane Surveying*.—Solar observation for latitude and azimuth. Stellar observation for azimuth at any hour angle. Transfer of azimuth down vertical and steeply inclined shafts. Tunnel survey. Simple triangulation with repeating instruments. Tacheometry with modern instruments and techniques. Adjustments of transit and level. Demonstration of electronic distance measurement devices, gyrotheodolite, etc. Work commences immediately following close of spring examinations, occupying twelve eight-hour days, or equivalent. This course will be given on a pass-fail basis. Textbook: Brinker, Elementary Surveying.

340. (1½) *Transportation Engineering I*.—The analysis and design of the elements of transportation facilities in development of transport technology; vehicle motion; vehicle/pavement interaction; elements of road design; principles of queueing and roadway capacity; rail transit performance and capacity analysis; economics as applied to transport. Applications and laboratory excercises. Prerequisites: STAT 251, CIVL 300. [0-0-0; 3-0-2]

361. (1½) *Applied Hydraulics*.—Design of simple pump systems and piping networks, pumping of slurries, elementary water-hammer analysis, open channel design and measurement problems. Associated laboratory experiments will illustrate these topics and give experience in measurement techniques. Prerequisite: APSC 281. [2-2*-0; 0-0-0]

447. (1) *Coastal Engineering*.—Elementary wave theory; harbour oscillations and applications to harbour design; wave behaviour in shoaling water, refraction and diffraction; wave forecasting from meteorological data; wave forces on piles and breakwaters. [2-0-0; 0-0-0]

453. (1½) *Elementary Photogrammetry*.—Principles of survey cameras; scales and distortions; single and stereo camera methods; determination of three dimensional coordinates involving parallax measurements; principles of continuous plotting machines; applications to engineering and allied problems. [2-0-2; 0-0-0]

454. (1) *Theory of Measurements*.—The theory of least squares and its application to the adjustment of survey observations by the methods of condition and observation equations. [0-0-0; 2-0-0]

455. (2) *Structural Theory II*.—Theory of the displacement method of analysis with its application to computer solution. A study of the load carrying behaviour of various structural forms. [2-0-0; 2-0-0]

456. (1½) *Photogrammetric Surveying*.—Analogue and analytical methods of surveying, mapping and measuring from photographs. [0-0-0; 2-0-2]

459. (1½) *Structural Mechanics*.—St. Venant torsion of solid bars; non-uniform torsion of thin-walled open sections; buckling of beams and rectangular plates with applications to code provisions; torsional and torsional-flexural buckling; dynamics of structures including response of multi-degree of freedom and continuous systems to arbitrary excitation. [0-0-0; 3-0-0]

460. (3) *Structural Steel Design.*—Plastic analysis and limit states design of steel frame structures; design of steel-concrete composite beams and steel plate-girder bridges by working stress and limit states procedures. [2-0-1; 2-0-1]

461. (3) *Reinforced Concrete Design.*—Analysis and design of reinforced concrete structures including beams, slabs, columns, footings and rigid frames. [2-0-1; 2-0-1]

462. (1) *Conceptual Design.*—A study of the relative merits of various structural forms, design projects, optimization. [0-0-0; 2-0-0]

463. (3) *Elementary Design.*—Design of simple structures, footings and retaining walls; use of codes and specifications. [3-0-0; 3-0-0]

464. (1) *Hydraulic Engineering.*—Discussion of general principles of hydraulic design illustrated by case studies. Hydraulic design and analysis of closed and open conduits and hydraulic structures. Pumps and pump selection. [0-0-0; 2-0-0]

465. (1) *Water Quality Studies.*—An outline of water quality parameters in natural waters; discussion of methods of analysis for water quality problems. [2-0-0; 0-0-0]

466. (1) *Water Resources Engineering.*—Introduction to the engineering, development of water resources projects; hydroelectric, irrigation, flood control, multi-purpose schemes. Hydraulic design of typical structures, reservoirs, spillways, for water resources projects. [0-0-0; 2-0-0]

467. (1) *Fluid Mechanics II.*—The influence of wind and water loading on typical two dimensional structures. Such loading is discussed using the theories of hydrodynamic lift and drag, boundary layers and turbulence. [2-0-0; 0-0-0]

468. (1½) *Basic Sanitary Engineering Concepts.*—A laboratory course to familiarize the student with the testing procedures used in water quality studies and in the operation of water and wastewater treatment plants. [1-3-0; 0-0-0]

469. (1) *Environmental Sanitation.*—An outline of the sanitation problems encountered in both the urban and rural community, with special emphasis on the public health engineering aspects thereof. [0-0-0; 2-0-0]

470. (1) *Transportation Engineering II.*—An introduction to transportation planning methods. Survey methods and analysis; forecasting; transport flow analysis; network analysis; new concepts. [2-0-0; 0-0-0]

471. (1) *Highway Design*—Traffic factors for design; geometric design; introduction to subgrades, pavements, drainage and earthwork; highway economics. [0-0-0; 2-0-0]

472. (1½) *Foundation Engineering I.*—Retaining structures both land and marine; cribs, bulkheads. Shallow foundations, bearing capacity and settlement, hydrostatic uplift and waterproofing, coefficient of subgrade reaction, vibrating machinery foundations. Pile Foundations: capacity and settlement single pile and pile groups, batter and laterally loaded piles. Caissons and cofferdams, dewatering. Culverts and conduits. Slope stability. [3-0-0; 0-0-0]

473. (1) *Foundation Engineering II.*—Practical aspects of foundation design and construction illustrated by case histories pertinent to B.C. Topics include: site investigation, piles and pile driving, retaining structures, bracing of excavations, dewatering, underpinning and concepts in earth embankment design and construction. This course will be given by prominent consulting engineers in the Province of B.C. [0-0-0; 1-0-1]

474. (1½) *Soil Stabilization.*—Recognition, understanding, and treatment of problem soils for engineering purposes; mechanical, chemical, electrical and thermal methods of stabilization; geotextiles; reinforced earth. Both a critique and a term paper are required. Prerequisite: CIVL 367 or equivalent. [3-0-0; 0-0-0]

475. (1) *Concrete Technology.*—A study of cement, aggregates and other concrete materials; mix design methods; control and testing; a review of current literature on concrete with regard to strength, workability, volume change, durability, porosity and permeability. [2-0-0; 0-0-0]

476. (1) *Legal Aspects of Engineering.*—Aspects of law encountered in engineering, with emphasis on contracts and specifications. Contract documents, including preparation of an assigned specification. Torts and independent contractor; sources of law and major subdivisions. Companies; partnerships; mechanics liens; agency; evidence; expert witness. [1-0-0; 0-0-0]

477. (1) *Properties of Asphaltic Concrete.*—Production, structure and properties of natural and petroleum refined asphaltic binders; the important characteristics of aggregates and their influence on the properties of asphaltic concretes; mix design, quality evaluation and control, mechanical properties and performance under service conditions of asphaltic concretes for pavement construction. [0-0-0; 2-0-0]

478. (1) *Hydrology I.*—Weather systems and precipitation processes; evaporation and transpiration, streamflow, groundwater, hydrologic measurements and data networks. Statistical methods, hydrograph analysis, reservoir and channel routing. [2-0-0; 0-0-0]

479. (1) *Earth Dams.*—Purpose and types of dams, design criteria, design construction sequence; compaction; seepage principles; seepage control; filter design, factors influencing the design section of earth dams; stability and deformation under static and earthquake loading; slope protection; field instrumentation. Prerequisite: CIVL 367 or equivalent. [0-0-0; 2-0-0]

480. (1) *Built Environment Studies.*—A study of the performance of enclosing envelopes as modifiers of natural climate; user environmental preferences; day-lighting; acoustics; thermal studies. [2-0-0; 0-0-0]

481. (2) *Urban Engineering.*—The application of urban analysis and systems engineering concepts to the planning, layout, design and operation of urban engineering services. [2-0-0; 2-0-0]

482. (1½) *Environmental Health Engineering.*—Engineering techniques utilized to overcome and eliminate public health problems in areas of water supply, treatment, transmission, and distribution; sewage collection, treatment and disposal; and solid waste collection, treatment and disposal. Existing legislation in each of these areas is briefly outlined. This course is intended for students not registered in an Engineering Department. [3-0-0; 0-0-0]

485. (1) *Traffic Engineering.*—Traffic analysis. Volume studies, speed studies, traffic stream characteristics, highway capacity and service level, freeway analysis, urban intersection analysis, signalization. [2-0-0; 0-0-0]

490. (2) *Construction Engineering.*—Management of construction. Planning the project, use of critical path methods. Selection of equipment. Cost of equipment. Cost of investment. Estimating. Bidding. Progress control. Types of equipment. Formwork. Some case histories of local projects given by construction engineers. [2-0-0; 2-0-0]

491. (1) *Construction Engineering Project.*—The project will demonstrate methods for the development of conceptual, preliminary and final design. It will draw information from all courses including feasibility study, economic aspects, material selection and design, as well as construction scheduling.

492. (1) *Prestressed Concrete.*—Analysis and design for flexure and shear, loss of prestress, anchorage zone stresses, deflections, composite beams and statically indeterminate beams. [0-0-0; 2-0-0]

493. (1) *Case Studies of Construction Methods.*—Practical aspects of construction methods illustrated by case histories of projects in B.C. Topics include underwater excavation, blasting, highway construction, tunnels, formwork, bridges and safety aspects of construction. Lectures given by prominent practising engineers. [2-0-0; 0-0-0]

495. (1) *Decision Analysis in Civil Engineering*—An introduction to the application of decision analysis and probabilistic models to the design of Civil Engineering systems subject to uncertain demands from the natural and man made environment. [0-0-0; 2-0-0]

498. (½-3) *Directed Studies.*—Requires approval of Department Head.

500. (1) *Fundamentals of Matrix Structural Analysis.*—The linear analysis of plane and space frame structures by the stiffness method. The design and programming of a general stiffness program for use on digital computers.

501. (1) *Applications of Matrix Structural Analysis.*—The stiffness method and the programming system will be extended to include structure buckling, yielding, vibration-modes, finite element and cables, and applied to such structures as shear walls, arches, suspension bridges and large frames.

507. (1½) *Dynamics of Structures, I.*—Fundamental analysis for the behaviour of structures and structural elements subjected to dynamic loading. A comprehensive treatment of the single degree of freedom system including the following topics: the theory of resonant vibration; energy dissipation in vibrating systems; periodic and transient exciting forces; force and response spectrum theory with special application to the earthquake problem; vibration analysis by integral transform methods and transfer matrix theory; random vibrations; introduction to multi-degree of freedom systems.

508. (1½) *Dynamics of Structures, II.*—A continuation of CIVL 507: The analysis of multi degree of freedom structures. Lagrange's equations; general normal mode theory; matrix methods in vibration analysis; damping in multi-degree of freedom systems; forced oscillations of multi degree of freedom systems with special reference to the earthquake problem; Rayleigh and Rayleigh-Ritz approximations, transfer matrix techniques; vibrations of continuous systems; wave propagation methods; random vibrations. (Prereq. CIVL 507.)

509. (1) *Random Vibrations.*—Review of basic probability theory. Introduction to random process theory; time averages, stationarity, ergodic properties, correlation, power spectral density; Gaussian processes, white noise, probability of extreme values. Stochastic response; single degree of freedom, transfer functions, narrow band systems, mean square response, fatigue, multi-degree of freedom systems; applications to discrete and continuous systems; introduction to nonlinear systems. (Prereq: CIVL 508 or equivalent.)

510. (1½) *Inelastic Bending and Limit Design I.*—Stresses and deformations in beams beyond the elastic limit; limit design; analysis by the mechanism and equilibrium methods; effect of shear and direct force; design of members for ultimate loads.

511. (1½) *Inelastic Bending and Limit Design II.*—Rigid plastic theory; non-rigid plastic theory; repeated loading; alternating plasticity and incremental failure; shakedown; order of hinge formation in frames; deflections.

513. (1½) *Advanced Reinforced Concrete Design I.*—Behavior of non-prestressed and prestressed concrete members under monotonic and cyclic bending, shear, axial and torsional loads acting singly and in combination. [3-0-0]

514. (1½) *Advanced Reinforced Concrete Design II.*—Design practice and procedures for non prestressed and prestressed concrete members and assemblies subject to various short and long term loads including earthquake loading and fire. [3-0-0]

516. (1½) *Design of Structural Timber Products.*—Testing procedures and influence of variability. Brittle fracture mechanics, weakest link principle and associated size effects will be analyzed. Development of advanced design formulae for bending, tension parallel-to-grain, tension perpendicular-to-grain, and shear. Column formulas for combined bending and compression will be developed.

517. (1½) *Analysis of Structural Timber Systems.*—Theory of elasticity for orthotropic bodies. Deformations and rheological properties of wood. Special considerations in the analysis of wood structural systems; connections and their implementation in the analysis. Non-linear material and connection properties. Computer simulations of system response. Load sharing and ultimate system behavior. Vibrational properties, accumulated damage models.

518. (1½) *Structural Reliability and Probabilistic Design.*—Probability concepts in structural engineering. Failure functions, structural reliability, probability of failure. FOSM methods, computer algorithms. Simulations, structural systems. Time dependent problems. Limit States Design.

519. (1) *Earthquake Engineering.*—Seismicity and seismic risk; design earthquake; linear and non-linear earthquake response analysis; design philosophy and codes of practice; design principles to minimize earthquake damage; soil behaviour and soil-structure interaction; case histories.

520. (1½) *Construction Planning and Control.*—Planning of civil engineering projects using networking techniques and time space methods. Treatment of resources and cash flow. Activity planning. Concepts of control at the project and activity levels. Prerequisite: CIVL 490 or equivalent.

522. (1½) *Project and Construction Economics.*—Review of engineering economics; investor objectives; capital expenditure modelling. Project financing mechanisms and preparation of feasibility studies, with emphasis on civil engineering projects. Cost modelling and cost estimating relationships for design and construction decisions. Sensitivity analysis. Case studies. Prerequisite: CIVL 490 or equivalent.

523. (1½) *Project Management for Constructed Facilities.*—Perspectives of project management as it relates to civil engineering. Case studies are used to illustrate key issues.

524. (1) *Legal Aspects of Project and Construction Management.*—Legal relationships in the construction industry. Prerequisite: CIVL 476.

528. (1) *Advanced Concrete Technology.*—Special topics in concrete: creep and creep prediction; durability; corrosion of concrete; quality control; non-destructive testing; new types of concrete. Prerequisite: CIVL 475, or consent of instructor.

529. (1½) *Advanced Strength of Materials.*—Torsion problems: St. Venant method, stress function solutions, membrane analogy theory, warping restraints. Special buckling problems: lateral buckling of beams, combined torsional-flexural buckling, shallow arches and thin rings, plastic buckling. Stresses in curved beams; thick cylinders.

531. (1½) *Theory of Plates.*—A study of stress distribution in flat plates by Fourier Analysis, finite differences, models, and the stiffness matrix approximation. Stability of compressed plates. Textbook: Timoshenko and Woinowsky-Kreiger, Theory of Plates and Shells.

532. (1½) *Theory of Shells.*—A study of the stress distribution and stability of various shell forms. Textbook: Flugge, Stresses in Shells.

533. (1½) *Energy Theorems of Structural Mechanics.*—Configuration space; generalized coordinates; holonomic and non-holonomic systems. Virtual work, virtual displacements; Fourier's inequality; stationary potential energy principle; Lagrangian multipliers; equilibrium; stability of equilibrium; matrix formulation of energy theorems. Canonical forms; generalized forms of Castigliano theorems; theorems of complementary energy. Calculus of variations. Variational theorem for mixed boundary value problems.

535. (1½) *Visco-elasticity and Plasticity.*—Introduction to the linear theory of visco-elasticity; visco-elastic models; constitutive relations; correspondence principles; numerical techniques; applications to problems. Introduction to plasticity; yield functions; incremental constitutive relations; slip line fields; bounding theorems; strain hardening.

537. (1) *Finite Elements.*—Minimum principles; displacement, equilibrium and hybrid models; convergence and bounds; plane elasticity and bending problems; other field problems.

538. (1) *Advanced Topics in the Finite Element Method.*—Practical programming; numerical studies, special applications such as to vibrations, shells, nonlinear material or geometry. Prerequisite: CIVL 537 or equivalent.
Note: Additional suitable courses in Engineering Mechanics are offered by the Department of Mechanical Engineering; MECH. 550, 561, 562, 565, 566, 567, 568, 569.

540. (1) *Advanced Fluid Mechanics I.*—Hydrodynamics of viscous and non-viscous laminar and turbulent flow with applications to fluid-structure interactions.

541. (1) *Advanced Fluid Mechanics II.*—Laminar and turbulent wakes and jets, stratified flows and diffusion processes with application to problems in lakes and estuaries. Prerequisite: CIVL 540 or equivalent.

542. (1) *Unsteady Flow in Closed Conduits I.*—Analyses of water hammer in penstocks and in pump discharge lines by graphical and characteristics methods; influence of friction; optimum gate closure.

543. (1) *Unsteady Flow in Closed Conduits II.*—A study of various single and multiple surge tanks by analytical, graphical and numerical methods; stability.

544. (1) *Steady Flow in Open Channels.*—Energy and momentum principles; uniform and gradually varied flow, backwater curves. Flow through transitions, bends and obstructions.

545. (1) *Unsteady Flow in Open Channels.*—Surge waves in power canals, locks, and navigation canals; method of characteristics; flood routing.

546. (1) *Rivers and Canals.*—Morphology of rivers and their characteristics. The consequences of disturbing river regime by engineering works. River-bed scour around flow obstructions (bridge piers, etc.). River regulation and control for navigation. Fishways and other fish passage devices. Mobile-boundary open channel flow. Sediment transport. Design of unlined silt-stable canals. Tidal discharge computations and convergence of estuaries. Dredging practices. Inland waterways. Hydraulic models.

547. (1) *Estuary Hydraulics.*—Estuary dynamics and estuary classification; the effect of engineering works on salinity intrusion; physics of estuary pollution and the use of computer and hydraulic models. Prerequisite: CIVL 447.

549. (1½) *Design and Analysis of Pipe Lines.*—Design procedures for and optimization of gravity and pumped discharge lines. Pump selection for single and compound systems. Valving. Operating. Analysis of transients and protective devices by graphical, numerical and characteristic methods. Prerequisite: CIVL 542.

551. (1) *Hydrology II.*—Advanced applications of statistical methods, hydrograph analysis and routing techniques. Flow forecasting procedures. Prerequisite: CIVL 478.

554. (1) *Water Resource Development.*—Availability of water, quantitative and qualitative requirements for water—municipal, agricultural, industrial, drainage and flood control. Water resource management.

555. (1) *Analysis of Civil Engineering Systems.*—Concepts and techniques of operations research, decision analysis, and systems engineering applicable to Water Resources and Transportation Engineering and Construction Management. Prerequisite: CIVL 375.

556. (1) *Water Resource Systems.*—Application of systems engineering concepts to the planning, design and operation of water resource systems.

557. (1) *Toxic and Hazardous Waste Treatment and Disposal.*—Environmental impact of disposal of toxic and hazardous wastes. Treatment technology for detoxification. Landfill disposal and self attenuation in landfills and underlying soils. Incineration with municipal wastes.

558. (1) *Water Resource Seminar.*—Directed case studies. Application of concepts, processes and techniques of water resource planning to specific problems.

559. (1) *Topics in Advanced Waste Treatment.*—Processes for removing wastewater impurities that are not effectively removed by secondary treatment; investigation of disposal practices that make use of the impurities as resources.

560. (1½) *Sanitary Engineering Design.*—Design problems in water and sewage treatment, with emphasis on the hydraulic and sanitary engineering considerations.

561. (1) *Solid Waste Treatment Systems Design.*—Design of sanitary landfills, compost plants, recycling systems; incineration concepts. Environmental impact analysis of various treatment methods. Relative costs of system components. Course structure will be tailored to the student's background and areas of interest.

562. (1½) *Sanitary Engineering Laboratory.*—A laboratory course to familiarize the student with laboratory procedures, instrument analysis, sampling techniques, and data analysis.

563. (1½) *Unit Operations and Unit Processes in Sanitary Engineering.*—Laboratory classroom and field assessments of sanitary engineering operations and processes. Prerequisite: CIVL 569 or equivalent.

564. (1) *Engineering Management of Solid Wastes.*—Characteristics of solid wastes; introduction to solid waste collection, treatment and disposal. Evaluation of current practice and analysis of future potential of landfills, composting, combined treatment, recycle and re-use.

565. (1) *Water Supply Engineering.*—An outline of water quantity and quality requirements of water users, and the development of possible courses of action for meeting these requirements. Costs of implementing schemes will be considered.

566. (1½) *Water Pollution Control Engineering I.*—Discussion of pollution parameters and sources; effects of pollutants on the water quality of rivers, lakes and estuaries; engineering techniques for handling water quality problems.

567. (1) *Water Pollution Control Engineering II.*—Industrial waste survey and design problems. Appraisal and analysis of existing water quality management systems. Water quality and effluent standards.

568. (1) *Water Pollution Engineering and its Ecological Impact.*—The chemical and biological processes involved in the cycling, transformations and distribution of inorganic compounds (nitrogen, phosphorus, sulfur and trace metals) and organic compounds (pesticides, hydrocarbons and detergents) in polluted water environments. Pre-requisites: Either Zoology 404, CIVL 567 or consent of instructor.

569. (2) *Waste Treatment.*—Development of the principles of secondary treatment processes (biological) with application to both municipal and industrial waste water treatment. Discussion of different treatment methods, incorporating both aerobic and anaerobic processes. Seminar sessions will be used to further develop the topics covered.

570. (1½) *Soil Mechanics I.*—Soil composition and geological factors affecting engineering properties, stress and strain at a point, principle of effective stress, stress-strain relations; theories of primary and secondary consolidation, settlement; shear testing equipment, stress-strain and strength behaviour of soil under static and dynamic loading.

572. (1½) *Applications of Physical-Chemical Principles to Clay Behaviour in Soil Engineering.*—Clay colloid theory; electrokinetic phenomena; structure of natural and compacted clays and its effect on swelling, shrinkage, compressibility, resilience, strength, pore pressure, permeability; mechanical and chemical soil stabilization; frost action.

573. (1) *Numerical Methods in Soil Mechanics.*—Applications of finite difference and finite element methods of analysis to the solution of stress, seepage, and consolidation problems. Foundation vibrations. Seismic analysis of earth structures. Prerequisite; CIVL 500 or equivalent.

574. (1½) *Experimental Soil Mechanics.*—Experimental studies of advanced aspects of soil behaviour; compressibility; shear strength; pore water pressure; dynamic tests; advanced instrumentation and measurement techniques; research reports required. Prerequisite: CIVL 570.

575. (1) *Geotechnical Ocean Engineering.*—Submarine geotechnical investigations properties of seafloor soils, foundations for offshore structures, shallow foundations (gravity platforms), deep foundations (jacketed platforms), submarine slope stability; anchors and mooring systems. Prerequisite: CIVL. 367 or equivalent.

576. (1½) *Civil Engineering Uses of Aerial Photographs.*—The use of aerial photographs for efficient and economical preliminary and reconnaissance soils surveys and for programming soil explorations. Use of photo interpretation in site layout and developing a boring and sampling program in the correlation of test borings, drainage studies, yardage estimates and in preliminary location studies for highways and dams. Prerequisite: CIVL 453 or equivalent.

577. (1½) *Soil Exploration for Engineering Design.*—Methods of subsurface investigations; techniques of soil sampling and insitu testing; vane test, mechanical and electrical friction cone, cone piezometer probe, pressuremeter; field measurements of the displacement, pore pressures and total stresses; emphasis on field work and demonstrations at project sites. Prereq. CIVL 367 or equivalent.

578. (1) *Principles of Pavement Design.*—Review of the principal factors and methods involved in the design of rigid and flexible highway pavement structures: pavement structure and types; factors involved in pavement structure design; rigid pavement design methods; joints in rigid pavements; flexible pavement design methods; distress mechanisms in flexible pavements; pavement condition evaluation; and, strengthening existing pavements.

580. (1) *Stress-Strain Models for Soil.*—Stress and strain, linear elastic and the incremental linear stress-strain models; stress dilatancy and dilatant elastic models; soil behaviour and crticial state concepts; concepts of plasticity; elasto-plastic models based on critical state; other stress-strain models. Prerequisite: CIVL 570 or equivalent.

581. (1½) *Soil Dynamics*.—Seismic loading and its effect on earth structures; dynamic response of single, and multi-degree of freedom systems and continuous systems; behaviour of soil under dynamic loading; pore pressure generation and liquefaction effects; seismicity and seismic design parameters; dynamic analysis of earth structures; seismic design of soil-structure systems.

582. (1½) *Transportation Engineering Impacts*.—Methods to measure, predict and evaluate impacts of transportation modes. Discussion of measures to reduce impacts.

583. (1½) *Urban Engineering Methods and Models*.—The application of urban analysis methods and models to the design of municipal and transportation engineering systems.

584. (1½) *Simulation and Modelling of Civil Engineering Systems*.—Random models, queue models, and discrete event simulation in construction management, urban and transportation engineering.

586. (1½) *Urban Transportation System Analysis*.—Development and use of urban transportation models, including travel generation models, distribution models, mode choice models and system evaluation.

587. (1½) *Transit Operations Engineering*.—Engineering analysis of public transit operations. Includes technological characteristics of operating systems, scheduling, routing, operating costs, fare structure, techniques of control, mode split analysis and the operational feasibility of new transit modes.

588. (1) *Transit Design Engineering*.—Design of bus and fixed rail transit facilities including supporting ways, stations, and analysis of system capacity and costs.

589. (1) *Traffic Flow Theory*.—A discussion of the various traffic flow distribution models, gap acceptance, queuing processes, traffic flow simulation with applications to intersection design, signal system design and control of urban freeways.

590. (1-3)**c** *Topics in Geodesy*.—Geometrical geodesy, electronic distance measurement, map projections, physical geodesy, satellite geodesy, geodectic astronomy, adjustment computations.

592. (1-3)**c** *Topics in Photogrammetry*.—Analogue photogrammetry, analytical photogrammetry, non-topographic uses of photogrammetry and photointerpretation.

598. (½-3)**c** *Topics in Civil Engineering*.—Lectures and readings on specialized topics of current interest in the field of civil engineering. To be given on approval of the Head of the Department.

599. (3-6)**c** *Thesis*.—For the M.A.Sc. degree.

699. *Thesis*.—For the Ph.D. degree.

Classics—See Classical Studies, Greek, Latin.

Classical Studies (Department of Classics, Faculty of Arts)

100. (3) *Introduction to Classical Civilization*.—The history, literature, art and architecture of fifth-century Athens and first-century Rome. Pertinent readings in translation and modern texts. [2-1; 2-1]

204. (1½) *Introduction to Classical Archaeology*.—A selective survey of the material cultures of the pre-classical and classical civilizations of the Mediterranean with emphasis on Italy, Greece, the Aegean and Asia Minor, intended to illustrate the history, principles, aims and techniques of classical archaeology and ancillary disciplines. (Also listed as Anthropology 204). [3-0]

210. (3) *Greek Thought*.—A survey of Greek philosophy, science and religion, given collaboratively by members of the Departments of Classics and Philosophy. The Presocratics; Plato; Aristotle; Stoicism; Epicureanism. This course is recommended as preparation for Classical Studies 436 and Philosophy 333. Open to second-year and first-year students. (Also listed as Philosophy 210.) [2-1; 2-1]

301. (1½) *The Technical Terms of Medicine and Biological Sciences*.—Acquaints the student with the Greek and Latin elements from which most specialized terms of modern medicine are constructed. Intended primarily for students planning to enter the medical, pharmaceutical or biological sciences. (Not for credit toward the B.A. degree.) [2-1]

303. (1½-6)**d** *Life and Society in Classical Antiquity*.—Topics in Greek and Roman life and society will be chosen from among the following: Science and Technology in Classical Antiquity, Athenian Law, Roman Law, Classical Astronomy and Ancient Medicine.

304. (1½) *Women in Classical Antiquity*.—The image of women in Classical Antiquity as it is projected in mythology, literature, and art, compared and contrasted with the reality of women's life as far as it can be reconstructed from historical, legal, and archaeological records. [3-0]

305. (3) *Classical Myth and Religion*.—The major cycles of Greek and Roman myth; their association with religion, cult and society. [3-0; 3-0]

310. (3) *Greek and Roman Literature*.—A study, through selected readings in translation, of the range and variety of literary forms invented and developed by the Greeks and Romans from Homer to Apuleius. [3-0; 3-0]

315. (3) *Classical Epic and Romance*—The art of fictional narrative in classical antiquity. Homer, *Odyssey;* Virgil, *Aeneid;* Ovid, *Metamorphoses,* Petronius, *Satyricon:* Apuleius, *Golden Ass;* Longus, *Daphnis and Chloe;* Heliodorus, *Aethiopica*. Classical forerunners of the novel. In translation.

316. (3) *Classical Drama*.—Study in translation of a wide range of plays, both tragedy and comedy, by the Greek and Roman dramatists. [3-0; 3-0]

330. (3) *Greek and Roman Art*.—A study of the achievements of the Greeks and Romans in art and architecture from the Bronze Age to the reign of Constantine. (Also listed as Fine Arts 329.) [3-0; 3-0]

331. (3) *Ancient History*.—The rise of the Greek city-states; special emphasis on the political, economic and cultural achievements of the fifth and fourth centuries B.C.; the growth of Rome and the development of her political institutions during the Republic; the social and economic history of the Empire; the transition from the classical to the medieval world. No prerequisite. [3-0; 3-0]

332. (3) *The Roman Republic*.—A detailed study of Rome from the foundation to the Augustan settlement. The development of the constitution; the political system; acquisition and growth of Empire; the political, social and economic consequences; the failure of the Republican system. Prerequisite: Classical Studies 331 or permission. [3-0; 3-0]

333. (3) *The Roman Empire*.—A detailed study of Roman imperial history from 30 B.C. to the end of the fourth century. Attention will be directed to the development of Christianity and to the problem of Church and State. Prerequisite: Classical Studies 331 or permission. [3-0; 3-0]

429. (1½/3)**d** *Studies in the Art and Archaeology of Greece and Rome*.—Prerequisite: Classical Studies 330 or permission of instructor. (Also listed as Fine Arts 429.)

430. (3) *Athens and Rome*.—A study of the monuments and topography of Athens (first term) and Rome (second term). Special attention will be paid to the archaeological sources. [3-0; 3-0]

433. (3) *Greek History to 404 B.C.*—A detailed study, in discussion, of the Greek city-states, their political and cultural evolution, their decline and their permanent contribution to western civilization. Historiography and historical method will be important objects of study. Emphasis in reading and discussion will be placed upon the ancient source-materials. Prerequisite: Classical Studies 331 or permission. [3-0; 3-0]

435. (3) *Greek History from 403 B.C. to Roman Times*.—The failure of the *polis*; Demosthenes and Philip; Alexander and Hellenism; the Successors; monarchy and federalism; literature and art; the great scholars. Prerequisite: Classical Studies 331 or permission. [3-0; 3-0]

436. (3) *Classical Thought*.—Intensive study of the development of thought in the Greek and Roman world in the areas of moral and political theory, science, religion, and metaphysics and epistemology. Topics vary from year to year and the Department should be consulted. Prerequisite: a course in Classical Studies or Philosophy, or permission. [3-0; 3-0]

440. (3) *Summer Practicum in Classical Archaeology*.—Practical training in excavation techniques and interpretation, including survey and mapping procedures, recording, drawing and analysis of artefacts, and study of comparative material. Students will participate in the excavation of a Greek or Roman site in the Mediterranean region for the summer session. The course will include lectures and field-excursions relevant to the region and period of the site.

Commerce

(Faculty of Commerce and Business Administration)

In general, prerequisties are not listed in the Commerce course section of the Calendar. The required courses in first year Commerce normally are prerequisite to the courses in second year. The required 200-level Commerce courses generally are prerequisite to 300-level and 400-level courses in the same option area. In each option, it is assumed that the required 300-level courses will be taken prior to the 400-level courses. Students should contact the Undergraduate Office for specific information about course prerequisites and variations from normal program sequences.

110. (1½) *Quantitative Methods in Business*.—Applications of basic mathematics and linear algebra to business and administration.

111. (1½) *Business Applications of Calculus*.—Introduction to differential and integral calculus and their applications in business.

120. (1½) *Principles of Organizational Behaviour*.—An introductory examination of work organizations and the behaviour of individuals within them. Phenomena to be studied include organizational structure, organizational environments, group processes, individual motivation, perception, communication, power processes and leadership.

151. (1½) *Fundamentals of Accounting*.—The analysis and communication of financial events and an examination of the accounting postulates underlying the preparation and presentation of financial statements.

153. (1½) *Financial Accounting*.—Review and extension of financial accounting concepts and their application to the financial statements studied in Com. 151 and to additional areas including income tax. Impact on financial statements of income determination, valuation, and classification alternatives. Use of financial statements for decisions through ratio analysis. Prerequisite: Commerce 151.

211. (1½) *Business Applications of Probability*.—Introduction to probability theory with emphasis on its use in decision making under uncertainty. Credit will be given for only one of Mathematics/Statistics 205 and Commerce 211.

212. (1½) *Business Applications of Statistics*.—Introduction to the theory and application of statistical inference, regression analysis and forecasting. Prerequisite: Commerce 211 or Mathematics/Statistics 205.

220. (1½) *Management of Organizational Behaviour*.—The application of behavioural and social science principles to the management of organizational phenomena. Emphasis will be placed upon the development of skills and techniques for managing problems such as organizational staffing, employee training, communicating and decision making, the designing of jobs and reward systems, conflict resolution and organizational development.

241. (1½) *Canadian Transportation*.—An introduction to the basic characteristics of the transport industry and to the issues in corporate and public policy decisions in transportation.

254. (1½) *Management Accounting*.—Basic concepts of accounting systems and reports providing information for management decisions. Application of these concepts to process and job order manufacturing activities using historical and standard costs. Further applications of the basic concepts in planning and control information systems.

261. (2) *Fundamentals of Marketing.*—A study of the basic considerations affecting the domestic and international marketing of goods and services.

271. (3) *Business Finance.*—Introduction to problems of financial analysis on decisions; Canadian financial institutions; working capital management; capital budgeting; valuation and cost of capital; capital structure and dividend policy.

291. (1) *Business Applications of Computers.*—Techniques of business data processing, including file organization, searching, updating and report generation. Application to problems from the functional areas of business utilizing system design and programming projects. Management of data processing activities.

306. (1½) *Urban Land Economics.*—An introductory course in Urban Land Economics for Graduate Students only. The course examines the economic factors affecting the demand for real estate, the history and current theories of urban land value and use, the operation and characteristics of real estate markets, organization of the real estate industry, the production of real estate, and selected topics on public land use policy.

307. (1½) *Urban Land Economics.*—Economic characteristics of urban real estate market; nature of urban land use; city growth and development; locational factors in determination of land use; types of interest in land; government regulations affecting land ownership.

308. (1½) *Real Estate Investment Analysis.*—(For graduate students only). An introductory course in real estate investment. The course examines real estate investment markets; analysis of investment decisions; financing arrangements; ownership forms and tax strategies.

309. (1½) *Real Estate Finance.*—Structure of the mortgage market in Canada; application of quantitative methods of finance to return and valuation issues; loan underwriting and the design of mortgage instruments; evaluation of alternative means of dealing with financial risks.

310. (1½) *Simulation Models in Business Decision-Making.*—Computer simulation, simulation languages. Typical business applications in financial planning, waiting line problems and other operating problems.

311. (3) *Decision Analysis.*—(For Graduate students only.) The use of quantitative methods to analyze decision problems. The analysis of decisions under uncertainty using the methods of probability and statistical decision theory. Techniques for analyzing data such as hypothesis testing and regression analysis. The analysis of allocation problems using the techniques of mathematical programming. Features of quantitative analysis of managerial significance are emphasized.

313. (1) *Quantitative Methods—Analysis.*—(For Graduate students only.) Theory and applications of basic mathematics and calculus to business problems.

318. (3) *Quantitative Methods I.*—(For Licentiate students only.) Theory and application of calculus, linear algebra, probability and stochastic processes to business problems.

320. (1½) *Organizational Analysis.*—An analysis of organizational structures and intra-organizational processes; effects of organizational factors on individual behaviour.

321. (1½) *Motivation and Reward Systems.*—An examination and appraisal of models of motivation and performance improvement. Determination of objectives, implementation and evaluation of programs for motivation, compensation and reward administration in organization. Prerequisite: Commerce 320.

322. (1½) *Labour Relations.*—An examination of the impact of trade unions on the management of industrial and commercial enterprises. This course will develop for the student of business administration an understanding of trade unions in Canada, their aims and objectives. Problems of public policy in the regulation of labour-management relations will be examined in detail.

323. (1½) *Human Resources Management I.*—(For Graduate students only.) Provides overview of the management of individuals, groups and organizations in the absence and presence of labour unions. Deals with the functions of management and with issues such as conflict, efficiency, leadership, interpersonal relations and negotiation.

324. (1½) *Personnel and Human Resource Management I.*—Activities, policies and practices required for effective human resource planning, external factors that influence human resource functions, and the recruitment, selection and assignment of personnel. The dual responsibilities of line managers and staff specialists are emphasized.

325. (1½) *Personnel and Human Resource Managment II.*—The second in a two-course sequence, this course examines in detail a number of the personnel transactions undertaken once a workforce has been recruited and deployed in jobs within the organization. Major topics covered include training and development, performance appraisal and career management techniques. Topics of employee welfare are also discussed.

326. (1) *Human Resources Management II.*—(For Graduate students only.) Managerial functions with special emphasis on labor relations, related issues and managerial skills.

330. (1½) *Topics in Business Law.*—(For Graduate students only.) Selected topics illustrate the interplay between the law and the business environment. Emphasis will be on the theoretical framework in which laws are developed and applied to commercial transactions.

331. (3) *Commercial Law.*—Introduction to the law of contracts, with particular reference to contracts for sale of goods (Sale of Goods Act) and related law of personal property; negotiable instruments (Bills of Exchange Act); elementary principles of agency; partnership (Partnership Act) and company law (B.C. Companies Act); examination of selected legal and commercial documents.

332. (1½) *Law of Business Associations.*—The application of various statutes to business entities including corporations, partnerships, societies, co-operatives, credit unions, trust companies and banks; the consequences of bankruptcy on legal entities. Prerequisite: Commerce 331 may be taken concurrently.

333. (1½) *Employment Law.*—Legal aspects of the employment relationship. Topics include: employment contracts, human rights legislation, standards of work legislation, the labour codes, Workers' Compensation Act and statutes dealing with related areas, e.g. unemployment and pension benefits. The focus of the course will be on the statutes, and decisions of the courts and tribunals. Commerce 331 may be taken concurrently.

336. (1) *Information Systems for Management.*—(For Graduate students only.) An introduction to information systems concepts for managers. The role of the general manager in all decisions relating to computerized information systems. The structure of an information system, its development, organization, management and evaluation.

337. (1½) *Land Law.*—Legal principles and concepts relating to real estate and land development.

341. (1½) *Business Logistics.*—The coordination of warehousing, materials handling, packaging, transportation and inventory control decisions in the distribution of products. Quantitative methods of logistics decision making. The role of logistics in the firm and its relation to production and marketing.

342. (1½) *Transportation Policy.*—(For Graduate students only.) A study of the economic and institutional setting of transportation as a basis for examining policy development within transportation companies and government, and as a background to the role of transportation in business logistics.

343. (1½) *Public Policy in Transportation and Public Utilities.*—A study of the special problems of government-owned and government-controlled businesses, with special reference to managerial, economic and regulatory aspects. Methods of organization, control of competition and price determination.

344. (1½) *Transportation Management.*—Practical problems in transportation management including equipment and route selection, scheduling, marketing, operations, and labour relations. Management impacts of regulation. Cases are drawn from all modes of transportation.

350. (4) *Accounting Information Systems.*—(For Licentiate students only.) The analysis and communication of financial events, including discussion of financial instruments associated with various types of business organizations, and an examination of the accounting postulates underlying the preparation and presentation of financial statements. The role of accounting information systems in the creation and application of the historical and projective data used by decision makers in the management of an enterprise.

351. (1) *Financial Accounting.*—(For Graduate students only.) A study of basic accounting concepts and methods; an examination of current principles and practices relating to published financial statements from the point of view of decision makers external to the firm.

352. (1½) *Managerial Accounting.*—(For Graduate students only.) An examination of accounting for management planning and control, including cost accounting, budgeting, accounting control systems, and use of accounting information in management decisions.

353. (3) *Financial Accounting — Intermediate.*—An examination of accounting as a means of measurement and as an information system for external reporting purposes.

354. (1½) *Cost Accounting.*—The provision and analysis of cost accounting information that will assist management in making operating decisions and in evaluating operational performance. The utilization of statistical analysis and linear models is included.

355. (1½) *Income Taxation.*—A study of income tax from the standpoint of the individual and of business enterprise.

356. (3) *Management Information Systems.*—Theory and current practice in determining and meeting managerial information requirements in organizations: data collection, storage, retrieval and modelling.

357. (1½) *Tax and Estate Planning.*—Income tax and succession duty laws are examined against the background of a number of cases designed to illustrate current estate planning practice. The value of life insurance and alternative investments is considered and several forms of property interests are discussed in detail. Prerequisite: Commerce 355.

358. (1½) *Advanced Mangement Accounting.*—Design of management planning and control systems, including an anlysis of the impact of investment project evaluation, inflation, decentralized organizational structures, and management incentive schemes.

361. (1½) *Marketing Management.*—(For Graduate students only.) Methods of analysis and strategic concepts applied to the problems of product selection, distribution, promotional activities, pricing and market research. The managerial decision focus typically employs analyses of actual complex cases drawn from consumer, industrial, service and non-profit organizations.

362. (1½) *Management of Promotion.*—An analysis of buyer behaviour; planning, controlling, and coordinating of the promotional functions of the firm.

363. (1½) *Marketing Strategy.*—Analytical methods applicable to marketing management decision-making, strategic considerations; the constraining effects of the social, legal, competitive and economic environments.

364. (1½) *International Marketing.*—An analysis of the bases of trade, international commercial policy, and other environmental factors which affect international marketing; followed by an investigation of the problems peculiar to the development and implementation of marketing strategy to serve international markets.

365. (1½) *Marketing Analysis.*—A study of quantitative methods of analysis applicable to the investigation of marketing problems; sources of market data; market tests; consumer research.

366. (1½) *Research Methods.*—The research process; methods of primary research; the formulation of a research design.

371. (1½) *Financial Management.*—Advanced problems of financial management from internal point of view. Debt policy and capital structure planning; capital costs and capital budgeting, dividend policy, valuation, mergers and acquisitions; public policy.

373. (1½) *Business Finance.*—(For Graduate students only.) The major financial decisions that businesses face; the analytical approaches that are available to assist with these decisions; and the links between these decisions, and the financial community.

374. (1½) *Security Markets.*—Introduction to theories and evidence concerning the structure of security markets and the valuation of stocks, bonds, options, and futures contracts; the role of portfolio management in informationally efficient security markets.

376. (1½) *Financial Institutions I.*—The financial systems in Canada; the practices of the major financial institutions; and theories of financial processes.

377. (1½) *International Financial Markets and Institutions.*—The structure and nature of the foreign exchange markets, and the private and official institutions involved in these markets, including spot, forward, futures, options, and offshore currency markets, and the institutions involved. Prerequisite: Commence 271.

378. (1½) *Risk Management Insurance.*—Management of personal and business risk. The insurance mechanism, life and non-life insurance, group benefits, pensions and social security.

379. (1½) *Fundamentals of Actuarial Science.*—Actuarial methods, life contingencies. Introduction to insurance and pension mathematics. Determination of premiums and reserves. Valuation of assets and mathematics. Rate-making. Prerequisite: Commerce 378 or permission of instructor.

381. (1½) *Industrial Organization.*—(For Graduate students only.) A survey of the management functions involved in establishing and operating a business with particular reference to manufacturing.

382. (1½) *Materials Control.*—A detailed study of the principles and practices involved in establishing standards and procedures for the control of quantity and quality materials in manufacturing processes.

383. (3) *Production Analysis.*—A study of industrial systems and of the relevant techniques of data collection and analysis. There will be special emphasis on the development and use of mathematical models of the production situation.

384. (2) *Industrial Management.*—(For Forestry and Agriculture students only.) A survey of industrial management principles, problems, practices, and procedures.

394. (1½) *Government and Business.*—Role of business in a regualted economy, capitalism and the corporation. Topics include market structure and performance, combines legislation, foreign ownership, social responsibility of business, technology, and specific regualtory constraints on business in Canada.

396. (1½) *New Enterprise Development.*—The particular problems and experiences encountered in starting, developing and managing new enterprises. The course includes lectures, guest speakers, and case studies.

406. (1½) *A Government Land Policy and Regulation of the Real Estate Industry.*—Analysis of the intention and impact of existing and proposed government participation in real estate markets. Consideration is given to justification of allocational and redistributional policies, constitutional powers, and methods of government intervention and regulation. Policies affecting the utilization of real property, and development, income and valuation, and ownership are discussed.

407. (1½) *Real Estate Valuation.*—Purposes of market value estimation; definitions of value; valuation as economic prediction; probability qualifications in valuation; productivity analysis; macro market analysis; micro market analysis; market simulation; methods of statistical inference; critique of the "Three Approaches to Value".

408. (1½) *Real Estate Investment Analysis.*—Investment and urban growth; investor objectives and motivations, measurement of investment productivity; fixed features and discretionary variables; processes of investment analysis; analytical models; special investment situations. Prerequisite: Commerce 407.

409. (1½) *City Growth and Structure.*—Urban economics; economic base analysis; communication systems; social, political and geological factors; land use controls; spatial assignment of activities; cohesion of functions; anatomy of land use; land use succession; dynamics of location; locational productivity analysis; urban planning; urban renewal.

410. (1½) *Methods of Management Science.*—A study of the methods of management science including formulation of models from a variety of areas. Attention will be given to the analysis of deterministic models of inventory, allocation (linear and non-linear programming), competition (game theory), and scheduling. Case studies will be used to illustrate the applications of the models.

411. (1½) *Topics from Management Science.*—A study of the methods of management science as applied to problems involving randomness or uncertainty. Particular attention will be given to statistical problems which arise in problem formulation and to decision making under uncertainty. Stochastic models of inventory, queuing, and allocation will be considered. The techniques of dynamic programming and simulation will be discussed in relation to the above models. Case studies will be used to illustrate the applications of the models.

418. (1½) *Quantitative Methods (II).*—(For Licentiate students only). Theory and application of statistics to business problems. Prerequisite: Commerce 318.

421. (1½) *Collective Bargaining.*—Structural, behavioural, legal and substantive aspects of labour management relations and the collective bargaining process. Prerequisite: Commerce 322.

422. (1½) *Public Sector Industrial Relations.*—Industrial relations in the Canadian sector and the experience of the parties in dealing with these issues. Studies of subsectors such as civil services, education and health care are undertaken. Prerequisite: Commerce 322.

423. (1½) *Grievance Administration.*—Grievance handling in collective agreements; the arbitration process; arbitral jurisprudence; substantive grievance issues such as discipline and promotions. Prerequisite: Commerce 322.

425. (1½) *Research Methods for Human Resource Management.*—Problems related to the collection of data from organizational participants for instituting changes in personnel policies and practices. Basic principles of scaling, experimental and quasi-experimental design and research ethics are treated, along with a survey of basic methodologies.

426. (1½) *Organizational Development.*—The tactics and strategies for implementing constructive modifications in organizations. Interpersonal relations skill building is emphasized in classroom activities, while lectures and assignments explore applications in business and non-business organizations.

432. (1½) *Business and the Administrative Process.*—An examination of the impact of the exercise of statutory power on business activity; techniques for implementing public policy affecting commercial transactions; rate structures, regulation of concerted action, marketing boards, marketing schemes subsidies, patent policy, and the exercise of discretionary power vested in statutory authorities.

441. (1½) *Advanced Business Logistics.*—The analysis of complex problems in physical distribution management and materials management. The formulation of logistics strategies and their integration into corporate overall strategy. The application of analytical techniques in the solution of logistics problems.

444. (1½) *Air Transportation.*—Development of Canadian air transport and public policy; airline management, air law and regulation; airline economics, with special reference to cost behaviour and demand for air transport; pricing, international associations and agreements on factors affecting economical operations.

445. (1½) *Water Transportation.*—A study of the economic characteristics of ocean transportation and the relationship of shipping to Canadian problems in trade and port development.

446. (1½) *Transportation in Economic Development.*—The role of transport in economic development with special emphasis on the application of cost-benefit analysis to the evaluation of private and public investments in transport facilities.

447. (1½) *Urban Transportation.*—Economic issues involved in providing transport services in urban communities: study of demand; cost of alternate systems; public and private financing problems.

450. (1½) *Advanced Accounting and Information Systems Topics I.*—The design and implementation of advanced computerized information systems.

451. (1½) *Advanced Accounting and Information Systems Topics II.*—Selected areas in accounting and information systems.

452. (1½) *Income and Other Taxes.*—A study of advanced income tax topics; consideration of tax provisions and tax burdens in selected foreign countries; an examination of selected B.C. taxing statutes. Prerequisite: Commerce 355.

453. (3) *Financial Accounting-Advanced.*—An examination of specialized topics of advanced financial accounting.

454. (1½) *Planning and Control Systems.*—An integrating course to synthesize accounting as a means of planning, control and furnishing of information in economic entities.

455. (1½) *Principles of Auditing.*—Principles of internal control, audit evidence, sampling and testing; audit reports; standards; responsibilities of the external auditor.

456. (1½) *Computer Audit, Security and Control.*—Audit, security and control implications of computer-based management information systems.

457. (1½) *Introduction to Financial Accounting.*—Financial accounting for business organizations; principles and problems of accounting measurements; forms of business organizations; financing of businesses. (For non-Commerce students in 3rd or 4th year only.)

458. (1½) *Introduction to Managerial Accounting.*—Use of accounting data in decision making by businesses; financial statement analysis; cash flows; cost behaviour patterns; methods of accounting for costs. (For non-Commerce students in 3rd and 4th year only.) Prerequisite: Commerce 151 or 457.

459. (1½) *Auditing Theory and Applications.*—Theory and applications of the principles of auditing; cases and research readings in current issues; analysis of the professional and economic aspects of external auditing. Prerequisite: COMM 455.

462. (1½) *Promotion Problems.*—Campaign strategy; planning, organizing, and controlling an advertising program; advertising research and analysis.

463. (1½) *Institutional Marketing Problems.*—An investigation of current developments in both retailing and wholesaling fields and their application to marketing institutions.

465. (1½) *Marketing Research Problems.*—The application of research methods to problems in marketing; a study of selected techniques of measurement and analysis; the use of behavioural and quantitative models in marketing investigations.

466. (1½) *Industrial and Resource Marketing Problems.*—Managerial problems involved in marketing Canadian industrial commodities and basic resources; an examination through problem analysis of producer goods and the specialized channels of distribution through which they flow.

467. (1½) *Marketing Management I.*—Strategic marketing analysis; product, communications, pricing and distribution strategies; and governmental regulation of marketing processes.

468. (1½) *Marketing Management II.*—Applied marketing planning with emphasis on a major industrial analysis and the subsequent development of a detailed marketing plan for an operating organization.

469. (1½) *International Marketing Management.*—An analysis of the scope and significance of contemporary international business operations with particular reference to the marketing management problems encountered by firms with multinational branches and subsidiaries.

471. (1½) *Theory of Finance.*—A study of the theory of resource allocation in the firm. The problems of applying models to financial planning.

472. (1½) *Quantitative Analysis of Financial Decisions.*—Application of modern quantitative techniques to the formulation of financial decisions under conditions of both certainty and uncertainty.

475. (1½) *Investment Policy.*—The management of security portfolios for individual and institutional investors; relation of investment policy to money markets and business fluctuations.

478. (1½) *International Financial Management.*—International financing, hedging and investment activities, sources of funds, asset pricing, bond markets, equity markets and capital budgeting. Topics include working capital management, financial control, transfer prices, taxation, and growth of multi-national corporations. Prerequisite: Commerce 377.

483. (3) *Planning and Control Problems.*—Advanced problems in planning and controlling work operations with special emphasis on quantitative analysis. Case and field work problems.

490. (3) *Essay.*—An essay on a selected business topic.

491. (1½) *Policy Analysis I.*—The development of a framework for understanding and analyzing policy problems in the private and public sectors. Techniques from a wide variety of disciplines are examined. The process of policy analysis is illustrated by using situational problems and case studies.

492. (1½) *Policy Analysis II.*—Techniques of policy analysis applied to complex problems. A business simulation game or projects based on actual situations drawn from business or government will be used.

503. (1½) *Housing Markets and Government Housing Policy.*—Seminar. The course is based on an analysis of the operation of one real estate market — the housing market — and the organization of its participants (consumers, investors, developers, brokers, and financial institutions). From this basis, the purpose, characteristics and implications of government housing (direct and indirect) policy is examined.

504. (1½) *Real Estate Assessment and Taxation.*—Analysis of the process of determination of taxable value and taxation of interests in real property. Emphasis is given to current practices, primarily in the context of local government real property taxes. Further topics include income, capital gains and capital taxes. Proposals for amending such practices are considered. The orientation of the course is to examine assessment and taxation as they affect real estate investment.

505. (1½) *Economics of Location.*—Location theory; industrial location; regional growth and locational equilibrium; locational distribution of urban activities.

506. (1½) *The Real Property Development and Redevelopment Process.*—Examination of the management of the complex process by which new real estate properties are produced. Development is traced through the land assembly servicing, construction and marketing and/or management of the finished property. Attention is given to the logistics, financing, legal and planning aspects. Finally, public and private redevelopment is considered.

507. (1½) *Seminar in Contemporary Land Investment Problems.*—Real estate investment analysis for both equity and mortgage investments, investment theory and urban growth, investment behaviour in the real estate market, applications of investment decision theory, feasibility studies, computer-aided impact models for investment analysis.

508. (1½) *Seminar in Government Policy in Relation to Urban Land Ownership.*—Community planning and its implementation, police power regulation, housing policies, urban renewal, mortgage money, policies, taxation, expropriation, landlord-tenant legislation.

509. (1½) *Seminar in Mortgage Financing.*—Advanced problems arising in the mortgage money market. Emphasis on contemporary problems of flow of mortgage funds. Comparative study of government and institutional policies.

510. (1½) *Seminar in Production.*—A course which considers the significant new approaches to production planning and control. Six typical production situations are studied in depth including batch environments, jobbing shops, process industries, flow line, assembly line and single unit assembly from the point of view of the manufacturing manager. Case studies from implementations in both large and small business are used extensively.

511. (1½) *Seminar in Business Applications of Management Science, I.*—The principal topic of this course is applications of linear programming. Numerous case studies are used and formulation and implementation are stressed, along with the practical implication of duality, parametrics and matrix generators. A course for students interested in applications of linear programming rather than algorithmic development.

512. (1½) *Seminar in Business Applications of Management Science, II.*—This course deals with applications of dynamic programming, queuing models, inventory theory, simulation, Markov chains and other frequently used methods of Management Science (excluding linear programming). Emphasis is on formulation and implementation. A wide range of case studies are presented concurrently with the theoretical developments.

513. (1½) *Computer Applications in Management Science, I.*—A course dealing with the computer as a tool for implementing management science techniques in business. Simulation, search techniques and management games are discussed.

514. (1½) *Computer Application in Management Science, II.*—A continuation of Commerce 513 involving a major simulation project and a critique of various papers on simulation. Prerequisite is Commerce 513.

515. (1½) *Linear Programming.*—This course is concerned with the development and use of linear programming models. Topics covered include formulation of linear programming models, linear programming theory, computer solution of linear programming models and selected applications in the functional areas of business.

516. (1½) *Nonlinear Programming.*—The course is concerned with the development and use of advanced mathematical programming models. Topics covered include formulation of nonlinear programming models, theoretical bases of non-linear programming, and selected applications in the functional areas of business. Prerequisites are Commerce 515 or 511 and consent of the instructor.

517. (1½) *Discrete Optimization, I.*—The course deals with a variety of discrete optimization problems and algorithms, including dynamic programming, scheduling theory and network flows. Prerequisites are a course in linear programming (e.g. Commerce 512 or 515) or consent of the instructor.

518. (1½) *Discrete Optimization, II.*—The course deals with a variety of discrete optimization problems and algorithms. Particular emphasis is given to integer programming methods, models, applications and the computational aspects of various algorithms.

520. (1½) *Organizational Behaviour and Administration.*—An examination of problems and issues in the administration of human resources in business organizations. The course will concentrate on specific behavioural and attitudinal problems which face the practising manager. Concepts, theory and research from various social sciences will be presented in analyzing determinants of and possible solutions to the problems.

521. (1½) *Personnel/Human Resource Administration.*—Day to day techniques for the management of human resources. Topics include personnel techniques and transactions such as job analysis, job evaluation, employee recruitment and placement, human resource planning and employee-employer relations.

522. (1½) *Management of Labour Relations.*—Negotiation and administration of collective agreements. Collective bargaining theories, preparation for bargaining, the negotiation process, the resolution of grievances and substantive issues of administering a collective agreement are considered. Prerequisite: 326.

523. (1½) *Selected problems in Labour Relations.*—Contemporary problems in labour relations and their implications for management and public policy. Topics include current issues in contract negotiation and administration, labour law, dispute resolution, bargaining structure, and responses of labour-management relations to technological and environmental change. Prerequisite: COMM 522.

524. (1½) *Organization Development.*—A course in Organization Behaviour which emphasizes tactics and strategies for introducing constructive modifications in organizations. Organization structures and intra-organization patterns or relationships provide the focus for this course which intends to prepare the student for the exposure he will confront in his early years in most organizations.

525. (1½) *Methodology of Organizational and Human Resource Management Research.*—The study of alternative methodologies of gathering data from human subjects for organizational and personnel management research. Strengths and weaknesses of various methodologies are compared in an evaluative manner.

527. (1½) *International and Comparative Labour Relations.*—An examination of labour-management relations in several countries, using a theoretical framework that includes the major varieties of industrial relations systems in the world.

528. (1½) *Manpower Planning.*—An application of basic concepts in labour economics to the development of manpower policy for a local area and the application of a planning model to the operations of a large firm where its operations could be viewed as an internal labour market.

529. (1½) *Organizational Analysis, Internal Power and Politics.*—An examination of models of how and why the structure of organizations is determined; strengths and weaknesses of alternative structures; the role of power and politics in organizations; and development of skills for application to actual problems encountered by managers.

534. (1½) *Computer Based Information Systems Analysis.*—Methods for analyzing and evaluating managerial and organizational information requirements to develop the specifications for computer based information systems. The course includes a brief overview of the systems design process. The information systems life cycle is considered from economic, behavioural, organizational, and technological perspectives, stressing the user/manager point of view.

536. (1½) *Computer Based Information Systems Design.*—Technological and managerial aspects of systems design and implementation emphasizing the perspective of the systems designer. Tools, and techniques for translating specified managerial and organizational information requirements into a detailed implementation plan which can be realized in computer hardware software. Evaluation and selection of computerized information systems.

537. (1½) *Data Base Design and Administration.*—An analysis of the role of the data base in an organization and functions of the Data Base Administrator. Data management technology and theory are studied from a managerial point of view. Included are topics of current interest such as data base privacy, security and standardization.

538. (1½) *Administration of Computerized Information Systems.*—This course covers major managerial issues which arise in the administration of computerized information systems including feasibility studies, personnel and organizational implications, and the management and control of data processing.

541. (1½) *Logistics Systems Analysis.*—The study of the firm's physical supply and distribution activities and their inter-relationships. Course material includes: logistics systems components and constraints, the role of transportation in logistics, applications of quantitative techniques to logistics problems, analysis and control of inventories, information systems requirements in logistics and concepts of warehousing and traffic management.

544. (1½) *Seminar in Transportation.*—The seminar generally seeks to serve two purposes: (a) to provide the students with a background in some of the basic economic problems in the transport industry together with an appreciation of their relevance and importance to today's society; and (b) to provide each student with an opportunity to study in considerable depth a problem that he finds of particular interest. Wide latitude will be given each student in the selection of his topic.

545. (1½) *Seminar in Transportation Economics.*—The objective of the seminar is to acquaint the student with problems in the appraisal of public investment in transport facilities. Topics include: problems in the measurement of the impact of transport investment; investment appraisal under conditions of externalities (both quantitative and qualitative), systems effects, uncertainty, etc.; the cost conceptual foundations and practical application of benefit-cost analysis; optimal pricing policies and investment decisions; financial constraints and the implications for the choice of investment of pricing policy; models and modelling in transportation planning.

549. (3/6)c *Masters Thesis.*—A comprehensive treatment of some theoretical or institutional problem.

551. (1½) *Advanced Accounting Seminar.*—The examination of selected areas in accounting.

552. (1½) *Seminar in Income Determination.*—A study, from the standpoint of senior management, of some of the varying concepts of business income and some of the underlying reasons for issues in its measurement and consideration of their implications for managerial and investor decision-making.

553. (1½) *Seminar in Accounting Standards.*—An examination and critique of financial statements and the accounting standards on which they are based. Development of a thorough understanding of financial statements from both the point of view of the accountant and the user (e.g. investor).

554. (1½) *Seminar in Information Analysis.*—Development and application of a conceptual framework for evaluating alternative information systems.

556. *Seminar in Management Accounting.*—A study of advanced topics in management accounting both from the point of view of the accountant and management. Prerequisite: Commerce 355.

557. (1½) *Seminar in Taxation.*—A study of taxation as it affects individuals and business entities.

562. (1½) *Marketing Strategy.*—An advanced course in marketing management focusing on the development and utilization of analytical approaches to marketing strategy formulation and marketing mix decision making. Areas covered include marketing models, positioning, product portfolio analysis, and new products. Attention will be given to the environment within which marketing decisions are made and to the variables which are controlled or influenced by the manager.

563. (1½) *Marketing for Industrial Operations.*—The methods of marketing analysis and planning applied to products and services purchased by organizations. All strategic elements of the marketing mix are discussed as they apply to industrial, government and reseller markets, with emphasis on sales management.

564. (1½) *Consumer Behaviour Seminar*—An examination of the consumer decision process and those cultural, social, institutional factors impinging upon the process. Emphasis is placed upon the utilization of the concepts of consumer behaviour in the development of marketing strategy.

565. (1½) *Seminar in Market Analysis.*—The economic and social determinants of demand, sales forecasting; market research methodology; the use of sampling, questionnaire design, and statistical inference in marketing investigations; sources of market data, the design of marketing investigations and the analysis of information for marketing management.

566. (1½) *Seminar in International Marketing.*—A study of the management of international marketing activities as performed by the individual firm. The seminar will deal with the foreign marketing of exported products and/or the products of overseas affiliates. Emphasis is placed on the policy and strategy formulation for the firm's international marketing efforts, and on the organization and administration of the firm's resources for accomplishing its international marketing objectives.

567. (1½) *Forecasting for Planning and Operations.*—Application of established forecasting procedures to planning and operational problems and sales forecasting for new and exisiting products including boot strapping, Delphi and other forecasting procedures. Prerequisites: COMM 311 and COMM 361.

568. (1½) *Seminar in International Business.*—A comparative study of the business and marketing systems employed in selected nations of the world. The seminar will deal with the relationships between business and marketing practice and the socio-economic environments of these nations.

569. (1½) *Marketing Management in Public and Nonprofit Organizations.*—Explores the role, use, and application of marketing in government agencies and nonprofit institutions. Develops a framework to analyze marketing problems outside the context of the private firm, examines how a marketing orientation can make public agencies and nonprofit organizations more effective and more responsive to consumer needs, and considers the social issues raised by the use of marketing in these contexts.

571. (1½) *Seminar in Financial Management.*—This course considers the application of financial theory to decision making within the firm in such areas as capital expenditures, mergers and acquisitions, leasing and capital structure decisions Particular emphasis will be directed to the application of analytical tools to specific case situations.

572. (1½) *Advanced Theory and Quantitative Techniques in Corporate Finance.*—This course considers recent developments in the theory of Corporate Finance and the application of quantitative techniques to corporate financial decisions. Deals with such areas as cash management, short- and long-term financial planning, investment programming and credit policy.

574. (1½) *Seminar in Security Analysis.*—Studies of recent research in principles and techniques of security analysis; valuation of securities; analysis of investment risks; use of statistical techniques in security selection. Review of theories on security price movements.

575. (1½) *Seminar in Investment Management.*—Policies and practices of institutional investors. Quantitative analysis of security and real estate investments. Market behaviour.

576. (1½) *Seminar in Financial Institutions.*—A study of the functional processes of monetary and non-monetary financial institutions participating in the market for financial assets. The seminar will deal with the implemental aspects of monetary policy and be concerned with the various attempts made to develop a theory of financial institutions.

577. (1½) *Seminar in International Finance.*—The organization and functioning of the international financial system; financial decision-making and planning of multinational firms.

578. (1½) *International Financial Management.*—The financial aspects of international business including financing and hedging activities of firms involved in international transfer of goods and services, and decision-making in connection with the asset management and financing of multi-national corporations.

579. (1½) *Seminar in Risk Theory.*—Studies of the collective theory of risk with practical applications. Stochastic models of risk enterprise. Ruin probabilities. Approximation methods. Reinsurance. Relationships between contingent claim models in the theory of finance and risk theory models. Prerequisites: Commerce 378 and 379.

581. (1½) *Statistical Methodology, I.*—A variety of statistical techniques are studied and appraised and their application to business problems is developed. This course deals primarily with topics in regression analysis, econometrics, analysis of variance, forecasting, and logit and probit analysis.

582. (1½) *Statistical Methodology, II.*—Multivariate statistical techniques and their application to business problems is developed. Topics include multivariate distributions, multivariate analysis of variance, discriminant analysis, canonical correlation, factor analysis, cluster analysis, scaling techniques, multivariate tests, and transformations for normality. Prerequisite is Commerce 581.

583. (1½) *Forecasting and Time Series Analysis in Business Environments.*—The methodolgy and practice of forecasting and time series analysis in business environments. Topics include: Forecasting and model building for stationary time series. Box-Jenkins methodology and practice. Multivariate systems and techniques. Bayesian approaches and state-space formulations. Regression methods in time series contexts. Prerequisite: COMM 581.

584. (1½) *Topics in Advanced Business Statistics.*—Topics covered will vary from year to year and include statistical quality control, sampling methodology in business environments, statistical modelling in business, data analysis in business statistics. Prerequisite: COMM 581 or consent of instructor.

585. (1½) *Applied Stochastic Processes, I.*—A study of stochastic processes and their applications in modelling. Particular attention is given to Poisson, renewal, Markov, semi-Markov, and regenerative processes and their applications to queuing, inventory, and other business systems.

586. (1½) *Dynamic Programming and Stochastic Control.*—This course studies the control of dynamic systems under uncertainty. Topics include stochastic finite horizon dynamic programming, control under imperfect information, infinite horizon Markov decision problems under discounted and average reward optimality criteria, and control of semi-Markov processes. Applications to inventory and queuing control will be considered.

587. (1½) *Seminar on Stochastic Models.*—This course will study in depth some advanced topic in stochastic modelling. The topic and content will vary from year to year and may include such topics as queuing, inventory and reliability theory.

589. (1½) *Seminar in Small Business Policy and Management.*—This seminar addresses the particular problems and experiences encountered in starting, developing and managing small businesses. The course includes lectures, guest speakers, written cases, and "live" cases based on studies of local independent businesses.

590. (1½) *Research in Business Administration.*— Directed research in a selected area of business administration.

591. (1½) *Seminar in Business Policy.*—A study of policy-making in business, government, and social fields.

592. (1½) *Seminar in Business Administration.*—An examination of present-day thinking and research in the field of business administration.

593. (1½) *Seminar in Research Metholdology I.*—(Of Business Administration). An introduction to problems of logic and epistemology peculiar to the management sciences. Empirical inference, theory construction and hypotheses testing especially under the impact of small confidence ranges. The philosophic background of modern decision theory. Economic problems of computerized knowledge creation, etc.

594. (1½) *Seminar in Research Methodology II.*—(Of Business Administration). The grounding of theories, the systems approach as a methodological tool, instrumental reasoning in economics and the administrative sciences, location of value judgements; epistemological problems of designing and testing systems. Prerequisite: Commerce 593.

595. (1½) *Energy Policy and Management.*—Advanced applications of policy tools to specific energy policy issues with special attention to the institutional frameworks of the business and public management systems. The course stresses methodological issues in a policy analysis context and the development of corporate strategy. Prerequisite: COMM 591.

596. (1½) *Managerial Decision-Making.*—This course surveys the basic concepts and theories of individual decision making from a number of disciplines. Applications to many different managerial areas are studied. The topics covered include: problems diagnosis, alternatives, uncertainty, information, preferences, risk, multi-objectives, criteria, and choice.

597. (1½) *Organizational Decision-Making.*—This course focuses on the variables and theories particular to the decision behaviour of groups and organizations. Applications are made to many group and organizational decision contexts including segmentation and specialization, risk, expertise, communication, teams, conflict and cooperation. Prerequisite: Commerce 596 or consent of instructor.

598. (1½) *Analysis of the International Business Environment.*—Development of general environmental framework for international business studies by drawing on international and development economics, research into government-business relations and studies in comparative sociocultural systems and political systems. Prerequisite: Economics 355 (which may be taken concurrently) or equivalent.

599. (1½/3)**d** *Selected Topics in Policy Analysis.*

611. (1½) *Seminar on Theoretical Developments in Management Science.*—A study of new theoretical developments in the field of Management Science. Areas investigated may include Stochastic Models, Mathematical Programming, Inventory Theory, and Sequential Decision Processes, among others. Emphasis will be on the elucidation of the underlying theoretical framework for some area or areas.

612. (1½) *Optimization Methods.*—The course will study in depth some advanced topic in optimization. The topic and content will vary from year to year. Prerequisites are Commerce 515 and 516 or 517 and 518.

625. (1½) *Seminar in Organizational Behaviour.*— Theoretical and research contributions from the social and administrative sciences relevant to behaviour in business organizations. Emphasis will be placed on evaluation and synthesis of theories and related empirical evidence in the field.

626. (1½) *Seminar in Manpower Management.*—Problems of manpower management at the local, regional and national levels. Emphasis will be placed on the integration of man-machine systems, development of manpower resources and the application of quantitative and computerized methods and research.

628. (1½) *Organizational Behaviour Research Seminar.*—A study of the process and methods of research in organizational behaviour. The course will concentrate on the design and execution of ongoing experiments, field studies and survey research, the selection or development of measuring instruments, problems of data collection and the qualitative and quantitative analysis of results.

649. *Ph.D. Thesis.*

651. (1½) *Advanced Accounting Seminar.*—An examination of the scientific aspects of the accounting model. Attempts to formulate accounting postulates and testable accounting hypotheses. Special emphasis is given to the problems of measurement and valuation and the discussion of various systems of micro- and macro-accounting.

654. (1½) *Research Seminar in Management Information Systems.*—This seminar intended primarily for doctoral candidates in Management Information Systems, will provide a forum for the presentation, discussion, and critique of current MIS research.

658. (1½) *Research Seminar in Accounting.*—Presentation of papers and research reports by graduate students in accounting, as well as by visitors and faculty members. Special permission for participation to be obtained from the instructor.

659. (1½) *Directed Studies in Accounting and Information Systems.*—Studies of special areas of accounting, information systems and related fields not offered in the regular curriculum. These studies, under tutorial guidance, are designed primarily for Ph.D. students.

660. (1½) *Research Seminar in Marketing.*—A study of the research process and the methodological problems in undertaking research in marketing. Particular attention will be given to sampling problems, the design of measuring instruments, the design of experiments, problems of data collection, and the analysis of experimental results.

661. (1½) *Seminar in Marketing Systems.*—An investigation of the structure of the marketing system and the institutions that contribute to the distribution of goods and services; the constraining effect of the social, legal, competitive, and economic environment on marketing variables.

662. (1½) *Seminar in Buyer Behaviour.*—Analysis of the factors influencing buyer behaviour. Methods of influencing demand are evaluated in relation to specific marketing objectives.

671. (1½) *Theory of Finance.*—Theories of decision making under uncertainty, valuation, continuous time models in finance, portfolio theory and options.

672. (1½) *Advanced Topics in Finance.*—Advanced topics in capital structure, dividends, effects of taxation and asymmetric information on valuation and financial decisions, and game theoretic problems in finance.

675. (1½) *Research Seminar in Finance.*

Communications Media and Technology

(Faculty of Education)

(N.B. These courses have been discontinued and will be offered only as required to meet the needs of currently registered students.)

314. (1½) *Communications Media and Technology in Learning: Theory and Use.*—A survey of the field: educational technology, information resource systems, and media studies. Educational use of available media resources. [3-1; 0-0] or [0-0; 3-1]

315. (1½) *Communications Media and Technology in Learning: Design and Production.*—An introduction to the design and production of resources in such media areas as television, film, photography, and audio. [2-2; 0-0] or [0-0; 2-2]

439. (1½) *Instructional Television: Principles and Application of Non-Studio Techniques.*—This course will stress the imaginative use of television in the school setting as a form of communication for students and teachers. The emphasis will be on production techniques using flexible and portable equipment rather than fixed studio equipment. Limited to fifteen students. [2-1; or 2-1]

494. (1½) *Communications Media Programs in Schools—Motion Picture Film and Television.*—Organizing, developing and teaching of motion picture study programs in educational institutions. The impact of film and television on the viewer. [2-1; or 2-1]

495. (1½) *Still Photography in Education.*—The design and production of educational photographic prints, filmstrips, slides and slide sets as resources for teaching and learning in school. The course is planned with an emphasis on educational design so that students may be able to produce effective educational resource material to stimulate learning in school. [2-1; or 2-1]

496. (1½) *Motion Picture Production in Education.*—Planning and production of educational motion picture resources for use in achieving specific learning objectives. This will include a study of motion picture design, pictorial continuity in relation to learning and production planning for educational purposes. [2-1; or 2-1]

508. (1½-6)c *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

516. (3) *Mass Media and Adult Education.*—The major information facilities and the context for adult learning they create. Types of learning resulting from each of the major media, by means of various experiments.

538. (3) *Communications Theory.*—Relationship of communications theory to other theory systems and communications design. Prerequisite: Communications Media and Technology 414.

539. (3) *Educational Television.*—An extensive study of the theory, practice, and evaluation of educational television, based on research. Prerequisite: Communications Media and Technology 414. Limited to 20 students in any one session.

540. (3) *Design of Instructional Media Systems.*—An analysis of the components within a systems approach and the design of media systems within the framework of instructional objectives. Organization and administration of learning resource centres. Prerequisite: Communications Media and Technology 414.

561. (1½-6)c *Laboratory Practicum.*

565. (1½/3)d *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)c *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)c *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)c *Master's Thesis.*

Community and Regional Planning

(Faculty of Graduate Studies)

425. (1½) *Urban Planning.*—For third and fourth year undergraduate students interested in urban planning in relation to their own discipline as well as more generally. Planning is examined as an aspect of social development, as an academic discipline, and as a professional practice. Particular attention is given to the relationship of planning to the politics of government and the land development process including the elements of site planning. The focus is on current Canadian planning and its historic antecedents. International comparisons are made. Prerequisite: Urban Studies 200, or Commerce 306, or Geography 350, or permission of the instructor. [3-0; 0-0]

500. (1½) *Fundamentals of Planning Practice.*—An introduction to the practice of planning, the scope and complexity of the field. The fundamental analytical skills and the personal communication and group behaviour skills required, decision making and the political process, alternative ways of dealing with uncertainty, the structure and evolution of the urban community. [3-0]

501. (1½) *History of Planning.*—The origins of urban planning in 20th century western thought, and social, political and aesthetic reform. The antecedents of regional planning in the conservation movement and as a means of reducing regional disparities. The history of urban and regional planning in Canada from 1900, international comparisons. [3-0]

502. (1½) *Planning Theory.*—Historical and contemporary statements about the planning process, its legitimacy, and alternative positions on the roles and responsibilities of planners. Typical practice dilemmas, their causes and resolution. The process of plan formulation and decision making, including goals, means and standards in planning. [3-0]

503. (1½) *Urban Planning and Economic Change.*—Economics of urbanization, suburbanization and deconcentation. Urban economic growth and the evolution of urban structure. Industrial and residential location and the urban land market. [3-0]

504. (1½) *Environmental Quality Planning.* —A planning-oriented approach to ecosystems theory; elements of environmental quality and the scientific basis for soil, air and water quality criteria and standards; comparative dynamics of human-oriented and 'natural' ecosystems, toward a functional definition of urban regions. [3-0]

505. (1½) *Social Policy Planning.*—The origin and development of social services, social planning theory and concepts, the present scope of social planning at regional and local levels, current issues in various social policy sectors. [3-0]

506. (1½) *Planning Administration.*—General legal principles affecting the administration of planning programs. The meaning and sources of the law, the separation of the functions of government, the Canadian Constitution, the law of Canadian Municipal Corporations, the nature and control of administrative action, judicial review of discretionary power, the drafting of legislation. [3-0]

510. (1½) *Introduction to Quantitative Methods in Planning.*—An introduction to various quantitative and modelling techniques applicable to planning and a basic working knowledge of several of the most useful. [3-0]

511. (1½) *Urban Spatial Models in Planning.*—The construction of urban spatial interaction and location models and their application in designing and testing plans. The modelling and interpretation for planning purposes of location and interaction decisions and the demand for transportation. [3-0]

512. (1½) *Simulation Models in Planning.*—The principles of systems analysis and simulation modelling applied to urban and regional planning. [3-0]

513. (1½) *Regional Development Planning I.*—The economic principles governing the structure, growth and development of regional economies and the application of the fundamental models and analytical methods of regional economics to problems of regional planning. [3-0]

514. (1½) *Impact Analysis for Planning.*—Methods for determining and integrating the analyses of the social, economic, and environmental impacts of selected major developments in resources utilization. [3-0]

515. (1½) *Data for Planning Practice.*—Data collection and analysis in the context of professional practice and its relationship to scientific theory. Evaluation of questionnaire, secondary, unobtrusive, and client participation methods. Scale and index construction. Practice in developing and presenting empirical conclusions using statistical analysis. [3-0]

516. (1½) *Evaluation of Alternatives in Planning.*—The selection of appropriate techniques for evaluating plans and operational programs. The feedback and decision serving roles of evaluation in the planning process. The application and limitations of: aggregated and disaggregated methods of evaluation, and such partial evaluation methods as impact statements, suitability analysis and the use of standards. The use of evaluation research techniques, indicators, experimental designs and demonstration projects in the evaluation and monitoring of operational programs. [3-0]

520. (1½) *Planning Engineering.*—A survey of the civil engineering aspects of community and regional planning. Topics covered include principles of soils and foundations, highway construction, sewerage, drainage, water works, waste treatment and disposal, street and transit systems, and subdivision control. For students without previous engineering knowledge. [3-0]

521. (1½/3)**c** *Site Planning.*—Site planning skills including site analysis, the process of site planning, housing types and densities, landscape, and community facilities. The second term provides the opportunity for the further development of these skills including the principles of urban design. [4-0]

522. (1½) *Housing and Community Planning.*—The role of housing in urban policy formulation and implementation. An historic view of housing policy and organization of government housing institutions with emphasis on Canada. Analysis of housing stock and potential demand in relation to housing policy using techniques of housing surveys and market analysis. The impact of legal/administrative instruments: building codes, occupancy standards, and zoning by-laws are examined. [3-0]

523. (1½) *Planning for Residential Communities.*—The physical, social and economic attributes of residential areas in relation to the spatial behaviour of residents. Theories of neighbourhood planning and spatial organization. Conventional and innovative approaches to housing and community facilities in the context of comprehensive land-use planning. [3-0]

524. (1½) *Urban Transportation Planning.*—The role of government in urban transportation planning, urban transportation organization, statutory and financial aspects in Canada. Transportation planning methods, transportation technology, systems characteristics and costs; transportation and land use. Case studies of major projects. [3-0]

525. (1½) *Planning Implementation.*—Methods of implementing community plans. Topics covered include: land-use controls, subdivision controls, aesthetic and building controls, historic preservation, sign control, scenic easements, expropriation, public land development, intergovernmental jurisdiction [3-0]

526. (1½/3)**c** *Public Policy in Urban Planning and Development.*—Public policy making theories, and case study analysis of the impact on urban development and planning of selected federal, provincial, and local government policies in Canada. As a consequence students will gain knowledge and skill in formulating specific policies in selected areas of urban and regional development and planning involving the three levels of government in Canada. [3-0; 3-0]

530. (1½) *Resource Analysis for Regional Planning.*—The ecological basis for regional land-use and associated resources planning; techniques for resource analysis and land classification. [3-0]

531. (1½-3)**c** *Introduction to Regional Planning and Management of Natural Resources.*—A broad perspective on the task of regional planning and management of natural resources. The role of values and preferences in resource management decisions, the nature of the process of conceptualizing management plans, the uses and limitations of various plan evaluation methods, the factors that influence the behaviour and performance of resource management institutions, and normative criteria for assessing institutional performance. Students contemplating this course should complete Geog. 366. [3-0; 3-0]

532. (1½/3)**c** *Natural Resource Regional Policy Issues in Canada.*—Identification and definition of major regional resource policy issues in Canada, review of literature bearing upon the resolution of these issues, and an outline of the kinds of analyses required for informed decisions to be made. The relationships between institutional structure and policy development and implementation are examined and ways of improving regional resource policies in Canada are explored. [3-0; 3-0]

533. (1½) *Seminar on Environmental-Economic Systems.*—The interrelationships between man's economic activities and the natural environment and their implications for resource management policies. [3-0]

534. (1½) *Regional Development Planning II.*—Regional development theory and practice; behavioural, functional-economic, social and technological interpretations of development; policy responses to the problems of depressed, resource frontier, metropolitan, and amenity regions, preparation of development plans and initiatives, and a review of Canadian regional development policies. [3-0]

535. (1½) *Seminar in Regional Development Planning*—The methodical review of recent literature in the field as the framework for a research paper by each of the students on an aspect of a thematic area that will vary from year to year. [3-0]

536. (1½) *Urban and Regional Planning in Developing Countries.*—A case study examination of the application of development planning theory in urban and regional planning for a particular Third World region which may vary from year to year. Topics covered include population, human resources, natural resources particularly agriculture, secondary and tertiary sectors, transportation, communication, human settlements and shelter. [3-0]

537. (1½) *Regional Transportation Planning.*—Scale and scope of the transportation sector in Canada, the role of government in development and regulation. Transportation and regional development. The policy development process at the federal and provincial government levels. Basic elements of airport and port planning, public access and land use implications. Social and environmental considerations in highway location. Intermodal transfer and terminal location. [3-0]

540. (1½-4½)**c** *Urban Planning Project.*—Intensive study of a selected urban problem area including comprehensive analysis, the evaluation of alternative policies, programs or plans, leading to a recommended course of action. Students will normally work in teams and present their findings to a real or simulated client group. Students may enrol in more than one project course. [0-4; 0-4]

541. (1½-4½)**c** *Regional Planning Project.*—Working in groups students undertake the examination of a complex problem in regional planning and resource development and produce a report documenting the findings as a basis for policy and program recommendations. Students may enrol in more than one project course. [0-4; 0-4]

548. (1½) *Current Issues in Planning.*—Each year the school may offer one or more courses on a topical issue covering recent advances in the field. [3-0]

549. (3-6)**c** *Master's Thesis.*—In their second year students are expected to select a thesis topic subject to approval of their committee which reviews progress periodically and conducts the final oral examination.

550. (1½-3)**c** *Directed Studies.*—In special cases and with the approval of the Director of the School, a student may study an advanced topic under the direction of a faculty member.

649. *Thesis for the Ph.D. degree.*

Comparative Literature

(Faculty of Graduate Studies—see also Comparative Literature under programs in the Faculty of Arts.)

500. (1½/3)**d** *Introduction to Comparative Literature.*

501. (1½/3)**d** *Studies in Genre.*

502. (1½/3)**d** *Studies in Literary Movements and Periods.*

503. (1½/3)**d** *Studies in Myth, Theme and Tradition.*

504. (1½/3)**d** *Topics in Comparative Literature.*

505. (1½/3)**d** *New Problems in Comparative Literature.*

506. (1½/3)**d** *Comparative Studies in Oriental and Occidental Literatures.*

507. (1½/3)**d** *Advanced Seminar in Literary Criticism.*

547. (1½-6)**c** *Reading Course.*

549. (3/6)**c** *Master's Thesis.*

649. *Ph.D. Thesis.*

Computer Science (Faculty of Science)

**For students in the Faculty of Applied Science*

**Additional fees are charged for these courses. See "Special Fees" P. 22.

Note: Computer Science 101 is intended for students wanting a one-term introduction to computer programming; Computer Science 114 is intended for those students planning further courses in Computer Science. Credit may not be obtained for more than one of Computer Science 101, 114, 151, and 251 or for more than one of Computer Science 116 and 118.

Students wanting to take any Computer Science course numbered above 200 other than 350 should see a Department adviser. In addition to the prerequisites listed, enrolment will be controlled by imposing stringent academic admissions criteria. Students should consult the Department during the spring or summer to determine the criteria for admission to these courses.

Students will be denied entry into third year courses where only a minimum pass has been obtained in prerequisite second year courses.

Students wanting to take any Computer Science course numbered above 200 (other than 251 and 350) should obtain and complete a Preapproval Application Form from the Department of Computer Science. In addition to the prerequisites listed, enrolment will be controlled by imposing stringent academic admissions criteria. Students should consult the Computer Science Department during the spring or summer to determine the criteria for admission to these courses.

101. (1½) *Introduction to FORTRAN Programming.*—Practical introduction to computer use. Aspects of the FORTRAN language and some common algorithms and applications. Students will compose and implement several programs. Programming style will be emphasized. Students wanting a more comprehensive introduction to Computer Science should take Computer Science 114 and 116. Prerequisite: Mathematics 100 or equivalent (may be taken concurrently). Credit will be given for only one of Computer Science 101, 114, 251. [3-1; 0-0] or [0-0; 3-1]

114. (1½) *Principles of Computer Programming I.*—An introduction to the structure and use of digital computers. Concepts of algorithm, program and programming. Principles of program design using PASCAL on terminals. Students will compose and implement several programs. In these exercises, emphasis will be placed on clarity and orderly development. Prerequisite: Mathematics 100 or equivalent (may be taken concurrently). [3-1; 0-0] or [0-0; 3-1]

116. (1½) *Principles of Computer Programming II.*—Systematic study of structured programming in Pascal; data representation, algorithm design. Introduction to computer organization. Prerequisites: Computer Science 114 and Mathematics 100 (may be taken concurrently). Credit will be given for only one of Computer Science 116 and Computer Science 118. [0-0; 3-1]

118. (1½) *Principles of Computer Programming.*—Systematic study of structured programming in Pascal; data representation, algorithm design. Introduction to computer organization. Prerequisite: Mathematics 100 may be taken concurrently and substantial programming experience. This course is intended for students with no prior experience in Pascal. Credit will be given for only one of Computer Science 116 and Computer Science 118. [3-1; 0-0] or [0-0; 3-1]

*151. (1½) *Introduction to FORTRAN Programming.*—A practical introduction to computer use. Aspects of structured FORTRAN and some common algorithms and applications. Introduction to MTS. Programming style will be emphasized. Intended for Applied Science students only. Prerequisite: 1½ units of first-year mathematics (may be taken concurrently). Credit will be given for only one of Computer Science 101, 151 and 114. [3-1; 0-0] or [0-0; 3-1]

210. (1½) *Computer Program Design I.*—Programming techniques of intermediate sophistication. Information structures and algorithms which operate on them. Students will undertake a programming project. Prerequisite: Computer Science 116 or 118. [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

213. (1½) *Computer Systems Structures.*—Introduction to assembly language. Computer arithmetic. Use of operating system services. Introduction to computer networking. Prerequisite: Computer Science 116 or 118. [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

220. (1½) *Introduction to Discrete Structures.*—An introduction to sets, logic, combinatorics, and graph theory, as applied in computing: sets and propositions, permutations and combinations, graphs and trees, Boolean algebra, algorithms and applications. Prerequisites: Computer Science 116 or 118, Mathematics 101. [3-0-1; 0-0] or [0-0; 3-0-1]

**298. (0) *Work Placement I.*—Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during the Winter term of the second year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Computer Science. Prerequisites: CPSC 210, 213, and 220.

**299. (0) *Work Placement II.*—Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during the summer following the second year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Computer Science. Prerequisite: CPSC 298.

302. (3) *Numerical Computation I.*—Discussion of numerical techniques for basic mathematical processes. Solution of linear equations, including analysis of roundoff errors; algorithms for the symmetric eigenproblem; solving nonlinear scalar equations; approximation of functions, including least squares and splines; numerical integration; Monte Carlo methods, introduction to the numerical solution of differential equations. Prerequisites: Computer Science 115 or 116 or equivalent; Mathematics 200 and 221. [3-0; 3-0]

304. (1½) *File Systems.*—Tape and disk device characteristics. Blocking and buffering. Access methods and algorithms for sequential, indexed sequential, and direct access files. Topics include B-trees, extendible hashing, secondary keys, multilist and inverted files. Sorting. Prerequisites: CPSC 210, 213. [3-1; 0-0]

310. (3) *Computer Program Design II.*—The design and implementation of large, multimodule program systems. Software life cycle. Design tools; features and use of module-oriented programming languages; intermodule communication. The group programming process. Includes a substantial group programming project. Prerequisites: CPSC 210, 213. Either CPSC 304 or CPSC 313 is a highly recommended corequisite to be taken in the first term. [3-1; 3-1]

311. (1½) *Definition of Programming Languages.*—Comparative study of advanced programming language features. Statement types, data types, variable binding, parameter passing mechanisms. Methods for syntactic and semantic description of programming languages. Prerequisites: Computer Science 210 and 220. [0-0; 3-1]

312. (1½) *Symbolic Computing.*—Principles of symbolic computing using functional or logic programming languages including LISP. Applications to artificial intelligence and knowledge representation. Prerequisites: Computer Science 210 and 220. [3-1; 0-0]

313. (1½) *Systems Programming.*—Introduction to the use of operating systems and systems software, emphasizing mini- and microcomputers. Introduction to a systems programming language. Multi-process programming and interprocess communication; relation to dataflow program design. Prerequisites: Computer Science 210 and 213. [3-1; 0-0] or [0-0; 3-1]

321. (1½) *Introduction to Theory of Computing.*—Characterizations of computability (using machines, languages and functions). Universality, equivalence and Church's thesis. Unsolvable problems. Restricted models of computation. Finite automata, grammars and formal languages. Prerequisites: Computer Science 210 and 220. [3-0; 0-0]

322. (1½) *Introduction to Artificial Intelligence.*—Problem-solving and planning; state/action models and graph searching. Natural language understanding. Computational vision. Applications of artificial intelligence. Prerequisites: Computer Science 210 and 220. [3-0; 0-0]

*350. (1) *Programming of Numerical Algorithms.*—Approximation, numerical integration, solution of systems of linear equations, solution of non-linear equations, random numbers and simulation, algorithms for solution of differential equations. Prerequisite: Computer Science 251. [2-0-1; 0-0-0]

**398. (0) *Work Placement III.*—Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during the summer following the third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Computer Science. Prerequisite: CPSC 299.

**399. (0) *Work Placement IV.*—Approved and supervised technical work experience in the computing industry for a minimum of 3.5 months. Normally taken during the Fall term of the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Computer Science. Prerequisite: CPSC 398.

402. (1½) *Numerical Linear Algebra.*—Investigation of the practical techniques of computational linear algebra. Orthogonal transformations and their application to the solution of linear equations, the eigenproblem, and linear least squares. Complete solution of the symmetric eigenproblem, including bisection and the QR method. Refinements of these techniques for sparse matrices. Prerequisites: Computer Science 302 and one of Mathematics 300, 315 or 320. [3-0; 0-0]

403. (1½) *Numerical Solution of Ordinary Differential Equations.*—Investigation of practical computational methods for ordinary differential equations. Multistep and Runge-Kutta methods for initial value problems. Control of error and stepsize. Special methods for stiff equations. Shooting, finite difference, and variational methods for linear and nonlinear boundary value problems. Prerequisites: Computer Science 302 and one of Mathematics 300, 315 or 320. (Not offered every year.) [3-0; 0-0]

404. (1½) *Introduction to Data Base Management Systems.*—Data Bases, File Structures for data bases. Data models — Relational, Hierarchical and Network; some languages of Data Base Manipulation. Structure of Data Base Management Systems. Integrity and Security in Data Bases. Prerequisite: Computer Science 304 (may be taken concurrently) or consent of Head of Department. [3-0; 0-0]

405. (1½) *Modelling and Simulation.*—Numeric models of dynamic systems with emphasis on discrete stochastic systems. State description of models, common model components and entities. A thorough description of a common simulation language. Simulation using algebraic languages. Methodology of simulation: data collection, model design, analysis of output, optimization, validation. Elements of queuing theory and its relationship to simulation. Applications to models of computer systems. Prerequisite: Computer Science 210. Corequisite: Statistics 305. [3-0; 0-0]

406. (1½) *Algorithms for Optimization.*—Linear programming: duality and sensitivity analysis. Algorithms for network flows and integer programming; the formulation of corresponding models. Scheduling, sequencing, and branch and bound algorithms. Applications in computer systems. Prerequisites: Computer Science 210; Mathematics 221 and 340. [0-0; 3-0]

407. (1½) *Organization of Computer Projects and Facilities*—Computer hardware — its cost and how it fits together; teleprocessing; computer networks. Software availability. Use of computer utilities. How and where programmers fit into an organization. Prerequisite: Fourth year standing in Computer Science. [0-0; 3-0]

410. (1½) *Introduction to Operating Systems I.*—Introduction to batch, multiprogramming and time-sharing systems. Process synchronization and communication. Virtual memory. Resource management and scheduling. Deadlock avoidance and prevention. File organization and management. Computer system protection and security. Prerequisites: Computer Science 313 and Computer Science 310. Computer Science 304 is recommended. [3-0; 0-0]

411. (1½) *Introduction to Compiler Construction.*—A practical introduction to lexical analysis, syntactic analysis, type-checking, code generation and optimization. This will be used to design and implement a compiler for a small Pascal-like language. Prerequisites: Computer Science 213 and 311. [3-0; 0-0] or [0-0; 3-0]

413. (1½) *Introduction to Computer Architecture.*—Control unit structure and microprogramming, memory organization, input-output techniques, microprocessors. Introduction to super-computer and beyond-Von Neumann architectures. Prerequisite: Computer Science 313 or Electrical Engineering 358. Same as Electrical Engineering 476. [0-0; 3-1]

414. (1½) *Introduction to Computer Graphics.*—Introductory concepts. Mathematics of computer graphics—transformations, algorithmic concepts, representations. Devices for computer graphics—input and output, active and passive. Architecture of graphics systems. Graphical programming languages. Software for computer graphics. Representation of graphical data. High level languages. Current prospects—three dimensional graphics, large data bases, animation, economics, specific application areas. Prerequisite: Computer Science 210 or Electrical Engineering 358 or permission of Head of Department. Same as Electrical Engineering 478. [3-0; 0-0]

415. (1½) *Introduction to Operating Systems II.*—Process synchronization and communication schemes, including message-passing and concepts of monitor and serializer. Virtual memory systems management and the problem of information sharing in such systems. The working set principle. Traps and interrupt handling. Elementary queuing theory and its applications such as process scheduling, system balancing and load control. File systems and operating system design methodologies. Prerequisite: Computer Science 410. [0-0; 3-0]

417. (1½) *Computer Communications.*—Layered protocols, packet switching, data communications, and queueing analysis. Data link controls. Virtual circuits, datagrams, network design, routing, flow and congestion control. Satellite and packet radio links. Local area networks. Prerequisite: Computer Science 313 or Electrical Engineering 358, and Mathematics 205/Statistics 205 or Statistics 251. Same as Electrical Engineering 456. [3-0; 0-0]

420. (1½) *Analysis of Algorithms.*—A study of the design and analysis of algorithms, illustrated from various problem areas. Topics include: models of computation, choice of data structures, space and time efficiency, computational complexity, algorithms for searching, sorting, and graph-theoretic problems, NP-complete problems. Prerequisites: Computer Science 210, 220; Mathematics 221. [0-0; 3-0]

422. (1½) *Intelligent Systems.*—Principles and techniques underlying the design, implementation and evaluation of intelligent computational systems. Applications of artificial intelligence to natural language understanding, image understanding and computer-based expert and advisor systems. Advanced symbolic programming methodology. Prerequisites: Computer Science 312 and 322. [0-0; 3-0]

430. (1½) *Computers and Society.*—Impact of computer technology on society; historical perspectives; social and economic consequences of large-scale information processing systems and automatic control; legal and ethical problems in computer applications. Computers and the individual: machine versus human capabilities, fact and fancy; problematic interface between man and machine. Prerequisite: 1½ units of Computer Science and at least Third year standing or permission of the Head of Department. [0-0; 3-0]

435. (1½) *Computer-based Image Analysis for Forest Inventory Systems.*—The digital processing of remotely sensed image data for forest inventory. Techniques for acquiring, calibrating, registering, enhancing and interpreting digital satellite data. Digitized planimetric and topographic map data bases. Case studies of existing forest inventory systems. Same as Forestry 435. Prerequisite: Computer Science 210 or permission of the Head of the Department. [0-0-0; 2-0-2]

448. (1½/3)c *Directed Studies in Computer Science.*—Open ordinarily to Honours students in Computer Science, with the permission of the Head of the Department. The course may consist of supervised reading, participation in a seminar, and one or more programming projects.

Note: Not all graduate courses are offered every year. Contact the department for current course offerings.

501. (1½) *Theory of Automata, Formal Languages and Computability.*—The scope and limitations of effective computation. General and restricted models of computation. Formal languages and grammars. Relations between automata and formal languages. Resource bounded computation. Applications in parsing, pattern matching, and the design of efficient algorithms. Prerequisite: Computer Science 321 or permission of instructor.

502. (1½) *Artificial Intelligence I.*—An introduction to AI emphasizing various approaches to the representation of domain specific knowledge and methods of reasoning using these representations. Typical applications to be discussed include natural language understanding systems, problem solving, deductive question-answering, production based expert systems and machine vision. Prerequisite: Sufficient programming background (e.g., Computer Science 315) and consent of Instructor.

503. (1½) *Computational Linguistics I.*—Formal models for natural language: phrase-structure grammars, context-free grammars, context-sensitive grammars, transformational grammars; syntactic analysis by computer. Prerequisite: Sufficient programming background (e.g., Computer Science 315) and consent of instructor.

504. (1½) *Database Design.*—Organizing information as relations. Information retrieval through queries against relations. Storing relations as data. Efficient storage and retrieval of data needed by queries. Reliability integrity, and security considerations, in database design. Prerequisite: Computer Science 404 or consent of instructor.

505. (1½) *Image Understanding I: Image Analysis.*—Image formation constraints and the processing of digital images in order to extract information about the world being imaged. Computational models for analysis. Prerequisite: Sufficient programming background (e.g. Computer Science 315) and consent of instructor. Computer Science 435 would be helpful.

506. (1½) *Complexity of Computation.*—Abstract complexity theory, time and space hierarchies, properties of complexity measures. Provably intractable problems, reducibilities and complete problems. P = NP question. Concrete complexity and algorithms design. Resource trade-offs. Prerequisite: Computer Science 321 or permission of instructor.

508. (1½) *Operating Systems.*—A study of principles and techniques for the design and implementation of operating systems. Prerequisite: Computer Science 410.

509. (1½) *Programming Language Principles.*—Comparative study of language constructs; effects on implementation.

510. (1½) *Numerical Methods for Boundary Value Problems.*—Finite difference and finite element techniques for boundary value problems in partial differential equations. Direct and iterative methods for the solution of the associated matrix equations. Prerequisite: Computer Science 402 or permission of instructor.

511. (1½) *Implementation of Programming Languages.*—Advanced techniques for the implementation of programming languages. Translator writing systems. Special classes of grammars of interest to compiler writers. Code optimization. Prerequisite: Computer Science 411.

512. (1½) *Knowledge Representation in Artificial Intelligence.*—Knowledge representation formalisms and their application in artificial intelligence research. Logical representations, semantic networks, object-centered representations: frame systems, schemata, scripts, and units. Network consistency techniques, continuous/discrete relaxation, schema labelling. Search: goal/data-driven, top-down/bottom-up control, automatic backtracking and generalized control regimes. Applications in computer vision, natural language understanding, expert systems. Prerequisite: Computer Science 312.

514. (1½) *Advanced Computer Graphics.*—Mathematics for advanced graphics—surfaces, shading, raster graphics, filters. High level language design and implementation. Surface representations. Special purpose data structures. Mini- and micro-graphics systems. Large scale systems. Real-time constraints. Device independent systems. Application areas. Current research areas. Prerequisite: Computer Science 414 or permission of instructor.

518. (1½) *Computer Systems Performance Evaluation.*—The basic computer performance evaluation techniques of measurement, simulation and mathematical modeling will be covered in the course. As well, their applications to performance improvement, computer selection, planning and computer design problems will be discussed. Prerequisites: Computer Science 410 or consent of instructor.

519. (1½) *Logic Programming and Functional Programming.*—An introduction to the theory, applications and implementation of logic programming languages and functional programming languages. Dataflow architecture to support logic and functional programming languages. Prerequisite: Computer Science 311, 312 and 319 or consent of instructor.

520. (1½) *Numerical Methods for Initial Value Problems.*—Finite difference techniques for initial value problems in partial differential equations. Explicit and implicit schemes for linear and nonlinear parabolic and hyperbolic problems, with a detailed discussion of numerical stability. Prerequisite: Computer Science 403 or consent of instructor.

522. (1½) *Artificial Intelligence II.*—Heuristic search and game playing. Problem solving and planning. Problem reduction, AND/OR trees, goal-directed behaviour. Expert, diagnosis, and advising systems. Knowledge-based systems. Prerequisite: Sufficient programming background (e.g., Computer Science 315) and Computer Science 503, or consent of instructor. Computer Science 502 would be helpful, but is not essential.

523. (1½) *Computational Linguistics II.*—Natural language processing by computer. Modelling of dialogue and discourse. Applications in question-answering interfaces for large databases. Prerequisite: Computer Science 503 or consent of instructor.

525. (1½) *Image Understanding II: Scene Analysis.*—Computer-based techniques for image understanding. The development of paradigms for knowledge representation and use in image understanding. Descriptive languages and picture grammars. Block world scene analysis. Control regimes. Programming languages and systems for perception. Representing scene domain knowledge. Applications to various scene domains including remote sensing. Prerequisite: Computer Science 505.

529. (1½) *Definition of Programming Languages.*—Approaches to defining the syntax and semantics of programming languages.

530. (1-3)c *Topics in Information Processing.*

531. (1½-3)c *Topics in Theory of Computation.*—Possible topics: algebraic structure of automata, program schemata, recursive function theory, computability and logic, language theory.

532. (1-3)c *Topics in Artificial Intelligence.*—Possible topics: current issues in representation and control, induction and learning, program systhesis, and robotics.

534. (1-3)c *Topics in Database Design.*—Possible topics: studies of particular database systems, design of special query languages, and studies of efficiency, reliability, and security in database.

535. (1-3)c *Topics in Simulation and Optimization.*—Possible topics: simulation languages, Monte Carlo methods, construction of models of various natural and artificial systems, implementation of optimization algorithms.

536. (1-3)c *Topics in Algorithms and Complexity.*—Possible topics: graph theory — algorithms and applications, geometric complexity, combinatorial algorithms, advanced data structures, arithmetic complexity, circuit complexity, approximation and probabilistic algorithms.

537. (1-3)c *Topics in Coding and Information Theory.*—Possible topics: Properties of Shannon's information measure, source encoding discrete memoryless channels, the fundamental theorem of information theory, linear and cyclic error correcting codes; selected topics from the analysis of channels with memory and from algebraic coding theory.

538. (1-3)c *Topics in Computer Systems.*—Possible topics: problems in multiprogramming; scheduling algorithms; performance measurement and analysis; software engineering.

539. (1-3)c *Topics in Programming Languages.*—Possible topics: formal aspects of translation; formal definition methods; extensible languages; correctness of programs. Applications of semantic methods to the design of language.

542. (1-3)c *Topics in Numerical Computation.*—Solution of nonlinear systems; application of interactive graphics to problems in numerical linear algebra; special topics in ODE's; special topics in approximation.

549. (3/6)c *Thesis for Master's Degree.*

649. *Thesis for Ph.D. Degree.*

Computing Studies Education (Faculty of Education)

217. (1½) *Microcomputer Programming I.*—Uses of microcomputers in education; introduction to programming. [3-1; 0-0] or [0-0; 3-1]

317. (1½) *Microcomputer Programming II.*—Advanced programming in at least two microcomputer languages; educational system development. Prerequisite: Computing Studies Education 217, *or* another computing course and experience with microcomputers and BASIC. [3-1; 0-0] or [0-0; 3-1]

400. (1½) *Computers in Education.*—Current research and practice concerning uses of computers in education, including computer-assisted instruction and computer-augmented instruction. [3-0; 0-0] or [0-0; 3-0]

404. (1½) *Curriculum and Instruction in Computer Science (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in Computer Science. Corequisite: Education 499. [3-0; 0-0] or [0-0; 3-0]

417. (1½) *Instructional Uses of Microcomputer.*—Development and use of computer assisted instructional units in specific subject matter areas. Psychological and sociological foundations for microcomputer applications in education. Prerequisite: Educational Psychology 301, 311, or 331; *and* Computing Studies Education 317, or an approved course in a computer programming language. [3-1; 0-0] or [0-0; 3-1]

508. (1½-6)c *Review of Research in Computing Studies.*—Studies are made of recent research bearing on the applications of computers in education.

546. (1½) *Seminar in the Teaching of Computing Studies.*—Curriculum, instruction and organization of computing studies courses in the secondary school. Prerequisite: Computing Studies Education 404 or extensive experience with teaching computing studies in the schools.

580. (1½-6)c *Problems in Computing in Education.*—Investigation and report of a problem from the area of Computing Studies Education.

Counselling Psychology (Faculty of Education)

362. (1½) *Basic Interviewing Skills.*—Development of basic interviewing skills for counselling and guidance. [3-3; 0-0] or [0-0; 3-3]

363. (1½) *Career Counselling.*—Critical survey of career counselling theory and practice. [3-0; 0-0] or [0-0; 3-0]

364. (1½) *Family Education and Consultation.*—Examination of current theories and practices in family education and consultation. [3-0; 0-0]

365. (1½) *Introduction to Theories of Counselling.*—An overview of selected theories of counselling. [3-0; 0-0] or [0-0; 3-0]

426. (3) *The Role of the Teacher in Guidance.*—This course is designed to assist the teacher in understanding and using guidance techniques for day-to-day use in the classroom. The emphasis will be on techniques for working with people towards better self-understanding and better perspectives of alternatives. [2-1; 2-1]

427. (1½) *Guidance: Planning and Decision-making.*—The work of the beginning counsellor and guidance worker in assisting students with educational, vocational, and personal planning and decision-making. [3-0; or 3-0]

433. (1½) *The Personal and Social Development of the Adult.*—Personal and social adjustment issues for professional counsellors; basic skills necessary for effective group counselling. [3-3; 0-0] or [0-0; 3-3]

504. (3) *Elementary School Counselling.*—Theory and practice of elementary school counselling.

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

514. (1½) *Counselling Adolescents.*—Theory, research, and practice of counselling adolescents.

524. (1½) *Counselling Adults.*—Major issues and problems of adult development. Selection of appropriate counselling interventions for use in education and other counselling settings.

531. (1½) *Interview and Non-Standardized Measures in Counselling.*—Theoretical assumptions in the use of non-standardized appraisal techniques.

532. (1½/3)**d** *Tests in Pupil Personnel Services.*—The use of standarized measures of mental ability, achievement, aptitude, interest and personality.

534. (1½) *Gender and Sex Role Issues in Counselling.*—Theory, research, and practice in the area of gender and sex role issues related to counselling.

544. (1½) *Family Counselling I.*—Counselling approaches as applied to the family, in educational and other counselling settings.

545. (1½) *Family Counselling II.*—Main theorectical and therapeutic approaches of contemporary family counselling with emphasis on intervention and critical research issues in educational and other counselling settings. Prerequisite: Counselling Psychology 544.

561. (1½-6)**c** *Laboratory Practicum.*

564. (1½) *Group Counselling.*—Understanding, designing and knowledge of groups and how to conduct them for use in counselling and guidance services.

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

574. (1½) *Career Planning and Decision-Making Counselling.*—Theory, research, and practice of career planning and decision counselling. Prerequisite: CNPS 363.

578. (1½/3)**c** *Counselling Theories and Interventions I.*—Major counselling theories, interventions for change, and corresponding skill development. Prerequisites: Counselling Psychology 361, 362.

579. (3) *Research on Guidance Services.*—Present resources and services together with techniques of assessing and using available material. Workshop in character, requiring experimental investigations.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

584. (1½) *Program Development in Counselling.*—Designing, implementing, and assessing counselling programs in schools, colleges, universities, and other counselling settings.

588. (3-6)**d** *Supervised Training in Counselling.*—Initial counselling experience under faculty supervision in department training centres.

594. (1½) *Cross-Cultural Counselling.*—Critical analysis of cross-cultural counselling theory, research and practice.

598. (1½/6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

601. (3/6)**c** *Doctoral Seminar.*

677. (1½) *Theories of Vocational Development.*—Sociological and psychological aspects of career planning, theories of vocational development, vocational choice.

678. (3) *Counselling Theory and Procedures II.*—Theories and procedures for counselling individuals with special problems in development requiring attitudinal and behavioural change; the counsellor's function in community liaison.

679. (1½) *Information Systems in Guidance and Counselling.*—The application of automatic data processing to guidance and counselling in student accounting, job placement, information dissemination and in interviewing. Prerequisite: Course in Computer Science.

699. *Doctoral Thesis.*

Creative Writing (Faculty of Arts)

Note: For admission requirements for all courses see Creative Writing entry under Arts.

202. (3) *Creative Forms.*—Designed for beginning writers, including first-year students by special permission. Short story, shorter play forms and verse. Instructors may also give assignments in other forms such as plays for screen, television or radio, or imaginative non-fictional prose. [0-3; 0-3]

301. (3) *Writing Techniques.*—Designed for Education students and for teachers who have had no workshop experience in writing. Techniques in the various genres, the use of reading as an aid to writing, and the treatment of original manuscripts will be covered. Major emphasis is given to the students' own writing; performance in workshop (i.e. opportunity to respond to and evaluate others' work), understanding of technique and basic principles in writing make up a minor portion of the final evaluation. This workshop may also be available during Summer Session. Limited to 20 students. Prerequisite: Permission of the instructor, which may be obtained by interview. [0-3; 0-3]

403. (3) *Writing of Children's Literature.*—Techniques of writing for children in various genres. Limitations as to the children's age group and genres to be set by the instructor. Instruction to be given through workshop and individual tuition. [0-3; 0-3]

404. (3) *Writing of Drama for Radio.* [0-3; 0-3]

405. (3) *Writing of Non-fictional Prose.*—The essay, biography, autobiography, etc., as creative forms. [0-3; 0-3]

406. (3) *Writing of Drama for Screen and Television.*—Some studio work may be required. Focus is on writing. Students whose chief interest is film or TV production should refer to Theatre Department listings. [0-3; 0-3]

407. (3) *Writing of Drama for the Stage.*—Studio work is required, and some plays may be given workshop-production. [0-3; 0-3]

408. (3) *Writing of the Novella or Novel.* [0-3; 0-3]

409. (3) *Writing of the Short Story.* [0-3; 0-3]

410. (3) *Writing of Poetry.* [0-3; 0-3]

415. (3) *Theory and Practice of Translation.*—Prerequisite: Evidence of promise as a translator and proficiency in at least one language other than English. [0-3; 0-3]

447. (3) *Directed Reading.*—The course will emphasize current trends and techniques rather than critical evaluation. Not offered every year. [0-3; 0-3]

491. (3) *Tutorial in Writing of Children's Literature.*—For students who receive departmental permission to do special advanced work in this genre. [0-3; 0-3]

492. (3) *Tutorial in Writing of Non-Fiction Prose.*—For students who receive departmental permission to do special advanced work in this genre. [0-3; 0-3]

493. (3) *Tutorial in Writing of Drama for Radio.*—For students who receive departmental permission to do special advanced work in this genre. [0-3; 0-3]

494. (3) *Tutorial in Writing of Drama for Screen and Television.*—For students who receive departmental permission to do special advanced work in this genre. [0-3; 0-3]

495. (3) *Tutorial in Translation.*—For students who receive departmental permission to do special advanced work in translation. [0-3; 0-3]

496. (3) *Tutorial in Poetry.*—For students who receive departmental permission to do special advanced work in this genre. [0-3; 0-3]

497. (3) *Tutorial in Fiction.*—For students who receive departmental permission to do special advanced work in this genre. [0-3; 0-3]

498. (3) *Tutorial in Drama.*—For students who receive departmental permission to do special advanced work in this genre. [0-3; 0-3]

503. (3) *Advanced Writing of Children's Literature.*

504. (3) *Advanced Writing of Drama for Radio.*

505. (3) *Advanced Writing of Non-Fictional Prose.*

506. (3) *Advanced Writing of Drama for Screen and Television.*

507. (3) *Advanced Writing of Drama for the Stage.*

508. (3) *Advanced Writing of the Novella or Novel.*

509. (3) *Advanced Writing of Short Fiction.*

510. (3) *Advanced Writing of Poetry.*

515. (3) *Advanced Workshop in Translation.*

521. (3) *Editing and Managing a Literary Magazine.*—Operation of a literary magazine; editing and evaluating creative writing submissions. Prerequisite: Permission of the instructor.

539. (3) *Advanced Projects in Creative Writing.* [0-3; 0-3]

547. (3) *Directed Reading. May not be offered every year.*

549. (3) *Thesis.*

Curriculum and Instructional Studies (Faculty of Education)

361. (1½) *Introduction to Curriculum and Instruction in Law-related Education.*—The rationales and objectives, teaching and learning activities, and curriculum materials for law-related education in elementary and secondary schools. [3-0; 0-0]

396. (1½-6)**d** *Curriculum Development and Evaluation.*—Practical and conceptual issues of developing and evaluating elementary and/or secondary school curricula will be discussed in relation to concurrent classroom pre-service or in-service experience.

487. (3) *Recent Developments in Elementary Curriculum and Instruction.*—An examination of recent changes in the organization and curriculum of elementary schools. [3-0; 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

561. (1½-6)**c** *Laboratory Practicum.*

562. (1½) *Foundations of Curriculum.*—History and development of the curriculum emphasizing the underlying perspectives that inform curricular choices and activities; principles and issues related to organization, development and evaluation.

563. (1½) *Curriculum Evaluation.*—An examination of various concepts and methods pertinent to the evaluation of curricula. Prerequisite: Curriculum and Instructional Studies 562.

564. (1½) *Curriculum Development.*—An examination of contemporary issues and research problems related to planned curriculum change and development.

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

566. (1½) *Curriculum Change and Implementation.*—Theories of educational change, current research literature, and principles for planning and evaluating curriculum implementation. Prerequisites: Education 562 and 563 or 564; Education 481; or consent of instructor.

567. (1½/3)**c** *Problems and Issues in Elementary Education.*—Recent developments, current issues, analysis and evaluation of research in elementary education.

572. (1½/3)**d** *Advanced Seminar in Curriculum.*—Examination of current theories and practices in the curriculum field emphasizing factors affecting decision-making. The emphasis of the seminar will vary according to faculty and student interests and students will be encouraged to investigate an area of personal concern and present their findings. Prerequisite: Curriculum and Instructional Studies 562, 563 or 564.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

601. (1½-6)**c** *Doctoral Seminar.*

699. *Doctoral Thesis.*

Czech/Slovak (Department of Slavonic Studies, Faculty of Arts)

325. (3) *Basic Czech and Slovak.*—An intensive study of grammar, basic vocabulary, and contrastive phonetics, leading to selected readings of contemporary texts in both languages. [3-0; 3-0]

Dentistry (Faculty of Dentistry)

Dentistry

440. (1) *Hospital Dentistry.*—An assigned externship with an affiliated Hospital Dental Service providing both didactic and clinical experience. The dental student is introduced to dentistry in the hospital setting with emphasis on hospital protocol and procedures, physical examination, diagnosis, and treatment of the medically compromised dental patient, pain and anxiety control, and emergency care.

500. (1½-3) *Advanced Topics in Oral Microbiology.*—Including processes involved in microbial growth, transport, energy metabolism and immunology.

501. (1½-3) *Advanced Topics in Oral Physiology.*—Neuromuscular control of mastication, occlusion, oral sensory mechanisms and salivation.

502. (1½-3) *Recent Advances in Oral Biochemistry.*—The chemistry and biochemistry of mineralized tissue, oral tissues, and saliva; biochemical mechanisms of plaque formation, calculus, malodor and other normal and pathological changes in oral fluids and tissues are considered.

510. (1½) *Advanced Topics in Periodontology.*—Basic scientific concepts relating to cause and development of the various diseases which may affect the periodontal complex, along with scientific assessment of principles and techniques involved in their recognition and treatment.

530. (1½-3) *Physiology and Mechanisms of Tooth Support.*—Studies on the inter-relationship between anatomical characteristics of the periodontal complex and its response to force application, with particular reference to the phenomenon of orthodontic tooth relocation.

550. (1½-3) *Advanced Topics in Restorative Dentistry.*—The course will develop the physical, chemical, functional and morphological principles underlying restorative dental treatment. Of particular emphasis will be planning of treatment arising from the understanding of the disease processes leading to restoration, and the constraints placed by the oral environment. Each subsection of restorative dentistry such as Prosthodontics, Pedodontics, Endodontics, Fixed Prosthetics and Dental Materials will contribute but a candidate will be encouraged to develop deeper understanding in one or other subsection. Laboratory assignments and clinical cases of relevance will be undertaken.

560. (1-3) *Research Seminars in Dental Science.*—Recent advances, experimental methods and methodology, and a critical review of literature in the life sciences, as they apply to the dental sciences.

561. (1½) *Directed Studies in Dental Sciences I.*

562. (1½) *Directed Studies in Dental Sciences II.*

599. *Master's Thesis.*

710. *Clinical Dentistry.*—Management of the medically compromised patient. Experience in endodontics, geriatric dentistry, oral medicine, oral pathology, oral and maxillofacial surgery, operative dentistry, periodontics and removable prosthetics.

711. *Specialty Rotations.*—Periods of two to four weeks are spent exclusively in anaesthesiology and plastic surgery with limited experiences in maxillofacial prosthetics, diagnostic imaging and laboratory medicine.

712. *Emergency Patient Management.* —Emergency treatment ranging from treatment of basic toothache to reduction of jaw factures.

713. *Seminars on Hospital Dentistry.*—Current topics relating to the practice of hospital dentistry including charts and records, endodontics, hematology, hospital protocol, medical laboratory testing, oncology, oral medicine, oral and maxillofacial surgery, plastic surgery, physical diagnosis and radiology. Residents will be required to review recently published dental literature related to hospital dental practice, and to review treated clinical cases.

714. *Directed Studies in Hospital Dentistry.*—Research papers on approved projects or case presentations.

Oral Biology

410. (2½) *Oral Embryology and Oral Histology.*—A lecture and laboratory course on the developmental, structural and functional aspects of tissues in the orofacial region.

411. (1½) *Chemistry of Oral Tissues.*—A course consisting of lectures and demonstrations of selected topics on chemical composition, function and properties of oral tissues and cellular elements with emphasis on biochemical processes associated with various oral conditions.

412. (1) *Dental Morphology.*—Gross anatomical morphological features of the teeth and supporting tissues. Emphasis is placed on technical terminology and ability to recognize and identify individual teeth, with particular reference to those special features of importance in occlusal function.

420. (1½) *Principles of Occlusal Function and Articulation.* —A course of lectures, demonstrations and laboratory exercises concerned with the function of the teeth and associated structures, and the principles of articulation and occlusal function as a basis for clinical treatment. Instruction is provided by members of the Departments of Oral Biology, Oral Medicine, Orthodontics, and Restorative Dentistry.

430. (1) *Oral Biology.*—Lectures, seminars and laboratory demonstrations designed to illustrate and emphasize the relation between the biomedical sciences and clinical practices. Topics covered include oral neurophysiology, evaluation of experimental dental research, microbial evaluation of caries risk.

440. (1) *Oral Biology.*—Lectures, student seminars and directed laboratory investigations designed to familiarize the student with contemporary research in the biomedical sciences related to dentistry.

448. (1-3) *Directed Research.*—An elective laboratory project taken with the permission of the appropriate supervisor and the Head of the Department. The results are to be presented in a written report. Open to undergraduate and graduate students registered in the Faculty of Dentistry. Course may be taken 1st, 2nd or both terms.

500. (3) *Research Seminars in Oral Biology.*—A course on the evaluation of experimental dental research. Topics covered include the characteristics and access of research literature, scientific methods, experimental strategies and measurement in Oral Biology. Students will be required to present a research seminar based on their thesis project and to develop and present a research proposal on a topic in Oral Biology which is not directly related to their thesis.

501. (3) *Craniofacial Biology.*—The course examines the principles and factors involved in the formation, development and growth of craniofacial tissues. It explores form and function in the region, emphasizing the role of the jaw and tongue muscles, stress distribution and its influence upon craniofacial growth.

502. (3) *Biology of Oral Tissues.*—A review of current research and findings in Oral Biology. Topics include the microbiology, immunology, cell biology, and biochemistry of the oral cavity. Special emphasis is given to the periodontium.

503. (1-1½) *Occlusion.*—A study of occlusion, masticatory function analysis, occlusal adjustment and treatment of occlusally related disease. Course retricted to students enrolled in the Graduate Periodontics Program or its equivalent. Credit will not be given for both ORBI 501 and ORBI 503.

561. (1-3) *Directed Studies in Oral Biology.*

649. *Ph.D. Thesis.*

Oral and Maxillofacial Surgery

420. (½) *Local Anaesthesia.*—Didactic and clinical sessions designed to familiarize the student with the concept of pain and the administration of local anaesthetic agents. Related anatomy, pharmacology, clinical considerations and practical experience are included.

430. (2½) *Introduction to Oral and Maxillofacial Surgery.*—Didactic and clinical instruction in the basic principles of oral and maxillofacial surgery. Students will participate in seminars and clinics and perform uncomplicated surgical procedures.

440. (1) *Oral and Maxillofacial Surgery.*—Didactic and clinical instruction in oral and maxillofacial surgery. Students participate in seminars and clinics and perform oral and maxillofacial surgery within the scope of the general practice of dentistry. Advanced techniques and procedures are discussed and demonstrated and specialty practice experience is provided.

Oral Medicine

420. (½) *Periodontics.*—An introduction to oral hygiene methods and the instruments and instrumentation used in the treatment of chronic inflammatory periodontal disease. Pre- or co-requisites: ORBI 410 and ORME 423 strongly recommended. [0-0; 0-1½]

421. (½) *Oral Diagnosis.*—An introduction to the diagnostic process; history-taking, physical examination, collecting and interpreting information, and treatment planning. Clinical participation is included.

422. (½) *Oral Radiology.*—A course in the theory and practice of dental radiography and an introduction to the principles of radiological interpretation. Clinical participation is included.

423. (1) *Dental Pathology.*—Lectures, slide presentations, and laboratory histopathology covering the basic principles of dental pathology as an introduction to pre-clinical and clinical dentistry. Emphasis is placed on the epidemiology, etiology, pathogenesis, and histopathology of carious and non-carious lesions of teeth, pulp and periapical disease and diseases affecting the periodontal tissues. An endeavour is made to relate the altered physiology and clinical chemistry with various lesions comprising these disease entities. [1-1; 0-0]

424. (1/2) *Principles of Medicine and Physical Diagnosis.*—Pathophysiology and subsequent clinical manifestations of diseases of the major systems and organs of the body. Emphasis is on the importance of these diseases in relation to dental therapeutics. [0-0; 0-2]

430. (1½) *Periodontics.*—Lectures and clinical practice in periodontal therapy.

431. (1½) *Oral Medicine and Oral Diagnosis.*—Didactic instruction in the diseases affecting the oral structures, including their nature, diagnosis, and treatment. Clinical participation is included.

432. (½) *Oral Radiology.*—A continuation of instruction in radiographic techniques and radiological interpretation. Extraoral techniques are emphasized, and the radiological features of lesions relevant to Oral Diagnosis and Oral Medicine are considered.

433. (2) *Oral Pathology.* —Lectures, slide presentations and laboratory histopathology covering the basic general pathologic principles underlying the discipline of Oral Pathology. Emphasis is placed on the epidemiology, etiology, pathogenesis, and histopathology of the diseases affecting the oral and paraoral structures. An attempt is made to correlate the various disease entities with actual clinical situations as an introduction to diagnostic and treatment principles. This course interfaces where appropriate with courses in Oral Radiology and Oral Medicine. [1-1; 1-1]

440. (2) *Periodontics*.—Lectures, clinics and seminars in advanced techniques in the treatment of periodontal disease. Practical experience in the treatment of periodontal disease is undertaken.

441. (½) *Oral Medicine and Oral Diagnosis*.—A continuation from Oral Medicine 431, including didactic and clinical instruction on the nature, diagnosis, and treatment of diseases affecting the oral structures.

442. (½) *Oral Radiology*.—This course is designed to improve competence in radiographic techniques, and to extend the student's scope in radiological diagnosis.

710. *Periodontal Case Management*.—A one term didactic course coming during the first year. It will consist of a survey of modern periodontal therapy to provide general objectives early in the student's clinical experience.

711, 721, 731. *Clinical Periodontics (clinical practice)*—The course runs consecutively throughout the program. It involves continuous activity in terms of the diagnosis and treatment of periodontal disease.

712. *Collection and Analysis of Diagnostic and Treatment Records*.—This course encompasses the basic skills required in photography, charting, model collection, etc. It will also provide the student with sufficient knowledge and experience to permit the selection and use of photographic equipment suitable for the photographing of patients, casts, instruments, radiographs and charts. The material generated following this course forms an integral part of various seminars in which the students participate.

713. *Oral Radiology*.—Seminars, tutorials and clinics to provide knowledge of radiographic technique and oral radiological interpretation.

714,724,734. *Periodontal Treatment Planning Seminars*.—Seminars to discuss prospective and comprehensive treatment planning for patients with periodontal disease.

715,725,735. *Periodontal Therapy Seminars*—These seminars will employ the case review method and deal retrospectively with specific phases of treatment of moderate to advanced periodontal disease.

716. *Oral Medicine and Clinical Oral Pathology*.—The course spans two terms. It includes a detailed consideration of medical problems and current medical treatment relevant to periodontal practice as well as didactic and clinical study of relevant aspects of oral pathology.

723. *Prescription Periodontal Surgery*.—The course runs for one term. It provides concentrated clinical experience in periodontal surgery. Specific surgical procedures are performed by the graduate student on a prescription basis for patients undergoing therapy in the undergraduate dental clinic.

727. *Clinical Teaching*—A one term course providing experience in the teaching of clinical periodontics to undergraduate dental students.

729. *Hospital Dentistry and Anaesthesiology*.—An intensive three week anaesthesiology experience at the University Hospital (Acute Care Unit). Offered in the last year of the program.

Orthodontics

420. (1) *Introduction to Orthodontics*.—This course is designed to provide the student with an understanding of the development of harmonious craniofacial and dental relations and aberrations involved in different types of malocclusions. Basic principles of tooth movement, orthodontic record preparation and analysis, differential diagnosis, treatment planning and appliance design and fabrication are discussed to prepare the student for clinical orthodontics. [0-0; 1-2]

430. (2) *Orthodontics, Principles and Practice*.—The course is designed to provide the student with a broad background and working knowledge of orthodontic classification, diagnosis, treatment planning and biomechanical principles, and treatment techniques. Clinical procedures are undertaken throughout the year.

440. (3) *Clinical Orthodontics*.—Seminars on a wide range of topics related to various malocclusions are coordinated with clinics for the treatment of selected cases. The course is designed to prepare the student for the management of orthodontic problems in general practice.

700. *Directed Studies in Orthodontics*.—A comprehensive overview of orthodontic diagnosis and treatment planning for the adult patient. Multidisciplinary approaches to case management are stressed.

701. *Advanced Clinical Orthodontics*.—Clinical experience in orthodontic diagnosis and treatment planning as a part of periodontic-orthodontic therapy, complementary to the material covered in Orthodontics 700.

Restorative Dentistry

410. (2) *Operative Dentistry*.—An introduction to the basic procedures involved in operative dentistry. Emphasis is on the integration of biological principles and technical skills in the approach to cavity preparation and design. The properties of appropriate dental materials are discussed. [1-3; 1-3]

420. (1½) *Operative Dentistry*.—A preclinical and clinical course with specific emphasis on the technical aspects of cavity preparation and design, along with placement of temporary and permanent restorations. The principles and procedures necessary for successful clinical practice are stressed.

421. (1) *Endodontics*.—This course covers basic endodontic theory, diagnosis and clinical technique.

422. (2) *Prosthodontics*.—The course comprises lectures, laboratory exercises and clinical demonstrations in fixed and removable prosthodontics.

423. (1) *Paediatric Dentistry*.—An introductory course, including lectures, laboratory exercises and clinical paediatric dentistry.

430. (2) *Operative Dentistry*.—A clinical program applying the basic principles of restorative dentistry.

431. (½) *Endodontics*.—A clinical program applying the basic principles of endodontics.

432. (2) *Prosthodontics*.—The course comprises lectures, laboratory exercises, clinical demonstrations and clinical practice in fixed and removable prosthodontics.

433. (2) *Paediatric Dentistry*.—A continuation of Restorative Dentistry 423 with greater exposure to clinical paediatric dentistry.

434. (1) *Pain and Anxiety Control*.—Lectures, tutorials and clinical practice in the recognition, understanding and treatment of both pain and apprehension.

440. (1½) *Operative Dentistry*.—Advanced clinical application of the principles of operative dentistry and their role in comprehensive patient care.

441. (1) *Endodontics*.—A continuation of Restorative Dentistry 431 with greater exposure to clinical endodontic dentistry.

442. (4) *Prosthodontics*.—Fixed and removable prosthodontics and dental materials. [1-9; 1-9]

443. (1) *Paediatric Dentistry*.—A continuation of Restorative Dentistry 433.

Economics (Faculty of Arts)

100. (3) *Principles of Economics*.—The institutions and processes involved in the production and distribution of wealth: the functioning of the market, monetary and fiscal policy, and international trade theory. The course also provides an introduction to Canadian economic institutions and policy (e.g., labour unions, the Bank of Canada, anti-combines policy, tariffs, the Government's budget, taxation).

Economics 100 is a required course for all students taking a Major or Honours in Economics. Students in their third or fourth year who want a survey course in Economics are advised to take Economics 309. [3-0; 3-0]

201. (1½) *Intermediate Microeconomic Analysis*.—Consumer behaviour, production, exchange, equilibrium of the firm under different market structures, factor markets, economic welfare. Intended primarily for Bachelor of Commerce students. Prerequisite: Economics 100; Mathematics 140 or 111. (Credit may be obtained for only one of Economics 201, 206 or 301.) [3-0]

202. (1½) *Intermediate Macroeconomic Analysis*—Income and employment theory, monetary theory, the open economy, economic fluctuations and growth. Intended primarily for Bachelor of Commerce students. Prerequisite: Economics 100; Mathematics 140 or 111. (Credit may be obtained for only one of Economics 202, 207 or 302.) [3-0]

206. (1½) *Intermediate Microeconomic Analysis*.—Consumer behaviour, production exchange, theory of the firm under different market structures, factor markets, welfare economics. An enriched version of Economics 201 intended for qualified students pursuing the major or honours degree in Economics. Prerequisite: Second-class in Economics 100 or 309, Mathematics 140 *and* 141. (Credit may be obtained for only one of Economics 201, 206 or 301.) [3-0]

207. (1½) *Intermediate Macroeconomic Analysis*.—Income and employment theory, monetary theory, the open economy, economic fluctuations and growth. An enriched version of Economics 202 intended for qualified students pursuing a major or honours degree in Economics. Prerequisite: Second-class in Economics 100 or 309, Mathematics 140 *and* 141. (Credit may be obtained for only one of Economics 202, 207 and 302.) [3-0]

254. (3) *The Economics of Public Issues*.—Discussion of selected topics, which will change from year to year including such topics as the economics of income security, education, health care, consumer decisions, natural resources policies and discrimination. Prerequisite: Economics 100. [3-0, 3-0]

301. (1½) *Intermediate Microeconomic Analysis*.—Consumer behaviour, production, exchange, equilibrium of the firm under different market structures, factor markets, economic welfare. Prerequisites: Economics 100; Mathematics 140 and 141. Credit may be obtained for only one of Economics 301, 201, or 206. Sections numbered in the 30's are reserved for graduate students. [3-0]

302. (1½) *Intermediate Macroeconomic Analysis*.—Income and employment theory, monetary theory, the open economy, economic fluctuations and growth. Prerequisites: Economics 100; Mathematics 140 and 141. Credit may be obtained for only one of Economics 302, 202, or 207. Sections numbered in the 30's are reserved for graduate students. [3-0]

306. (1½) *Advanced Microeconomic Analysis*.—A selection of topics in microeconomic theory, such as general equilibrium, welfare economics, the economics of uncertainty, capital theory. Prerequisite: Second-class in Economics 206 or 201; Mathematics 140 *and* 141. [3-0]

307. (1½) *Advanced Macroeconomic Analysis*.—A selection of topics in macroeconomic theory, such as general equilibrium macroeconomic models, the economics of inflation, rational expectations, non-Walrasian equilibrium. Prerequisite: Second-class in Economics 207 or 202; Mathematics 140 *and* 141. [3-0]

308. (1½) *Principles of Microeconomics*.—An introduction to the functioning of the market system; concepts of supply and demand; behaviour of the consumer and the firm; the role of prices. Particular emphasis will be given to applications of theory to contemporary issues. Open to students in Health Services Planning and to other third year and fourth year or graduate students by permission of instructor. Prerequisite: none. (Credit may not be obtained for both Economics 308 and either Economics 100 or 309.) [3-0; 0-0]

309. (3) *Principles of Economics*.—The scope of this course is approximately the same as that of Economics 100. It differs in that it deals with fewer topics in greater depth, relating theory to contemporary economic issues. It is open only to Third- and Fourth-Year students. Prerequisite: Third or Fourth Year standing. (Credit may not be obtained for both Economics 309 and Economics 100.) [3-0; 3-0]

312. (3) *Political Economy of Capitalism*.—An intellectual history of the evolution of the capitalist system and its institutions; a selection of defences and criticisms of alternatives to capitalism from the writings of leading social and political philosophers of the 18th century through their critics and defenders in the 20th century. Prerequisite: Economics 100 or 309. [3-0; 3-0]

319. (3) *History of Economic Thought*.—The development of economic analysis from ancient to modern times, including some description of the changing environment in which economists wrote. Selections from the classics in the field from Aristotle to Keynes. Prerequisite: Economics 100 or 309. [3-0; 3-0]

320. (1½) *Introduction to Mathematical Economics*.—Application of single and multivariable calculus to economics. Includes comparative static analysis of household and firm behaviour as well as simple dynamic models. Prerequisites: Economics 100; Mathematics 140 and 141. [0-0; 3-0]

325. (1½) *Introduction to Empirical Economics*.—Essentials of probability and statistics for applied work in economics. Topics include descriptive statistics, probability, estimation, hypothesis testing, and analysis of variance. Prerequisites: Economics 100 or 309 (may be taken concurrently) and Mathematics 140 and 141. (Credit may not be obtained for both Economics 325 and Statistics 305.) [3-2; 0-0]

326. (1½) *Methods of Empirical Research in Economics*—Techniques of empirical economic research. Topics include simple and multiple regression, time series analysis and simultaneous equation estimation. Students will be required to undertake applied work. Prerequisite: Economics 325. (Credit may be obtained for only one of Economics 326, and Statistics 306.) [0-0; 3-2]

334. (3) *Economic History of Modern Europe*.—Economic growth and development in Europe mainly since 1750. Empirical study of important changes in social and economic institutions; examination of their significance for structural change and the process of industrialization; analysis of growth, change and fluctuation in the major western economies until recent times. Prerequisite: Economics 100 or 309. [3-0; 3-0]

336. (3) *Economic History of Canada*.—The growth of the Canadian economy in relation to development of natural resources, changing market conditions, industrialism, communications and technology. Prerequisite: Economics 100 or 309. [3-0; 3-0]

341. (1½) *Economic Development of Asia*.—Economic development under colonialism, the colonial legacy, population, trade and development, land reform, the Green Revolution, industrialization strategies, distribution of gains from development. Each topic is discussed in the context of Japan, pre-1949 China, or a Southeast Asian country. Prerequisite: Economics 100 or 309. [3-0]

342. (1½) *The Economy of China since 1949*.—The Maoist strategy of development, the commune system and rural development, the pace and pattern of industrialization, management and planning, incentive policy, economic lessons from China. (Students who wish to contrast different approaches to development may find it useful to take Economics 341 and 342 as a sequence). Prerequisite: Economics 100 or 309. [3-0]

345. (3) *Money and Banking*.—The role of money and financial institutions in a modern economy; structure of the financial system; credit expansion and the process of monetary control; international financial institutions; foreign exchange rates, international capital flows; monetary theory and policy. Prerequisite: Economics 100 or 309. (Credit may not be obtained for both Economics 345 and 447.) [3-0; 3-0]

350. (3) *Government Finance*.—The constitutional framework for government finance in Canada. Analysis of government expenditures with particular reference to unemployment insurance, pensions, medical and hospital care, housing, welfare, and education. Theories of justice in taxation. Effects of government revenues and expenditures on redistribution of incomes, unemployment and inflation. Government revenues, with particular reference to income taxes, sales taxes and property taxes. Federal-provincial and provincial-local financial relations. Government debt. Prerequisite: Economics 100 or 309. [3-0; 3-0]

355. (1½) *International Economics*.—Introduction to international trade. Attention will be focused on determinants of trade, theory of international values, tariffs, and other barriers to trade. Some reference will be made to international financial issues and capital flows. Prerequisite: Economics 100 or 309. (Credit may not be obtained for both Economics 355 and 455 or 456.) [3-0]

360. (1½) *Labour Economics*.—A study of the Canadian labour market. Labour supply; the allocation of the time among work and non-market activity, participation in the labour force, education and training. The demand for labour. The determination of wages and employment. The effect of unions on wages and employment. The wage structure; wage differentials by occupation, industry, race and sex. Unemployment. Prerequisite: Economics 100. Credit may not be obtained for both Econ. 360 and 460. [3-0]

361. (1½) *Economics of Industrial Relations*.—Economic aspects of industrial relations in Canada. Why workers join unions. The theory of trade union behaviour. The labour movement in Canada. Wage determination under collective bargaining. The causes of strikes and lockouts. Unions and the wage structure. Prerequisite: Economics 100. Credit may not be obtained for both Economics 361 and 461. [3-0]

365. (1½) *Industrial Organization*.—Mergers, bigness, monopoly power; firm behaviour under various structural conditions; public policy. Prerequisites: Economics 100 or 309. (Credit may not be obtained for both Economics 365 and 465 or 466.) [3-0]

370. (1½) *Benefit-Cost Analysis and the Economics of Project Evaluation*.—Techniques and problems in benefit-cost analysis of public projects. Examination of alternative approaches to public decision-making such as cost-effectiveness analysis and multiple objective frameworks. Case studies of projects in the areas of natural resources, the environment, human resources, public services, and transportation. Prerequisite: Economics 100 or 309. [3-0]

371. (1½) *Problems in Natural Resource Use*.—Efficiency criteria in various resource-based industries. Analysis of market failures. Environmental effects and conservation policies. Choice of industries for intensive study will depend on student interest. Prerequisite: Economics 100 or 309. (Credit may not be obtained for both Economics 371 and either 471 or 472.) [3-0]

374. (1½) *Land Economics*.—Economic analysis applied to problems of land use. Rent theory. Land valuation. Land conservation. Techniques for assessing economic efficiency of land use. Effects of institutions and public policies on land use. Prerequisite: Economics 100 or 309. [3-0]

384. (1½) *Economic Analysis of Health Services*.—Microeconomic theory of resource allocation with emphasis on the applications of optimizing models of health service markets. Analysis of Canadian problems in health service supply. Models of the consumer/patient, the physician/entrepreneur, the not-for-profit hospital/firm, and the third party regulatory and payment agency. Prerequisite: Economics 308, 100 or 309. [0-0; 3-0]

387. (1½) *The Soviet Economy*.—Pre-revolutionary economic development, industrialization debate, economic development under Stalin. The centrally planned system, the role of plan and prices, resource allocation, sectoral problems (agriculture, foreign trade). The growth record; economic reform; management and innovation, imported capital. Prerequisite: Economics 100 or 309. [3-0]

395. (3) *Honours Seminar*.—Reports and group discussion of selected topics. Open only to Honours students in their Third Year. [2-0; 2-0]

406. (1½) *Advanced Microeconomic Analysis*.—Methodology; general equilibrium; welfare economics; micro distribution theories; real theories of capital and interest; the theory of the firm. Prerequisite: Economics 201 and 202 or equivalent. (Credit may not be obtained for both Economics 306 and 406.) [3-0; 0-0]

407. (1½) *Advanced Macroeconomic Analysis*.—General equilibrium macroeconomic models; the economics of inflation; stabilization policy; economic growth; macro theories of distribution. Prerequisites: Economics 201 and 202 or equivalent. (Credit may not be obtained for both Economics 307 and 407.) [0-0; 3-0]

417. (1½) *Welfare Economics*.—The criteria for evaluating economic performance with special reference to the problems of justice in the distribution of income and economic efficiency. Topics include social evaluation functions, pareto-optimality, compensation criteria, and consistency of collective decision making. Prerequisite: Economics 201 or equivalent. [3-0]

420. (3) *Mathematical Economics*.—Dynamic models; the application of difference and differential equations to simple models of growth and business cycles; the application of linear programming to economic analysis; general equilibrium models and the mathematics of marginal analysis. Prerequisites: Economics 201 and 202 or equivalent, Mathematics 200 and 221, or permission of the instructor. [3-0; 3-0]

422. (1½) *Mathematics for Economists*.—A course designed to provide the required preparation in mathematics for the study of graduate economic theory. Solving systems of simultaneous equations; unconstrained and constrained maxima; elementary theory of difference and differential equations. Prerequisites: elementary calculus (functions, limits, differentiation and integration of functions of one variable) and permission of instructor. [3-0; 0-0]

429. (1½) *Introduction to Econometrics*.—The multiple regression model, applications and extensions. Prerequisite: Mathematics 221; Economics 325 and 326. [3-0]

437. (3) *Economic History of the United States*.—An economic analysis of basic issues in the development of the United States from the Colonial Era to the present. Examination of some of the recent challenges to the orthodox interpretation of U.S. economic growth. Prerequisite: Economics 201 and 202 or equivalent; or Economics 334 or 336. Major and Honours students in History who do not meet these prerequisites may be admitted with permission of the instructor. [3-0; 3-0]

440. (3) *Economic Development and International Poverty*.—Theories of economic development with particular reference to underdeveloped economies; explanations for persistent poverty; problems of carrying out development programs; relationships between rich and poor countries. Prerequisite: Economics 201 and 202 or equivalent. [3-0]

447. (1½) *Monetary Policy*.—Money in the economic system; banks, financial institutions and markets; foreign exchange market, interest rates, and international capital flows; theory and practice of monetary policy. Prerequisites: Economics 201 and 202 or equivalent. (Credit may not be obtained for both Economics 447 and Economics 345.) [3-0]

450. (3) *Government Finance*.—Economic analysis of government expenditures: the rationale of government provision of goods and services; analysis of selected government expenditure programs. The economic analysis of taxation; criteria for optimal taxation; analysis of specific taxes; coordination of federal and provincial revenue systems. Prerequisites: Economics 201 or equivalent. (Credit may not be obtained for both Economics 350 and Economics 450.) [3-0; 3-0]

454. (1½/3)**d** *Economics of Human Resources*.—The economics of health care, education and income security, including the analysis of existing programs and alternative policies. Prerequisites: Economics 201 or equivalent. [3-0] or [3-0; 3-0]

455. (1½) *International Trade*.—Comparative costs and factor endowments; theory of international values; tariffs, quotas, and other controls on trade; theory of international trade policy; current problems and issues. Prerequisite: Economics 201 or equivalent. (Credit may not be obtained for both Economics 355 and 455.) [3-0]

456. (1½) *International Financial Systems*.—Balance of payments; market for foreign exchange; mechanism for adjusting balance of payments; internal vs. external stability; current problems and issues. Prerequisites: Economics 202 or equivalent. (Credit may not be otained for both Economics 355 and 456.) [3-0]

460. (1½) *Economics of Labour Markets*.—The theory of labour supply and demand for individuals, households and firms. Policy implications for Canada of guaranteed annual incomes, taxes on income, unemployment insurance, Canada Pension and other benefit programs. Employee selection and hiring, promotion and earnings profits. Prerequisites: Economics 201 and 202. Credit may not be obtained for both Economics 360 and 460. [3-0]

461. (1½) *Economics of Trade Unions*.—The sources of union power. Union wage and employment policy. Bargaining theory. The influence of unions on relative wages. The effect of unions on the general level of prices and wages. Inflation, unemployment and trade unions. Industrial disputes. The theory of third-party settlement of industrial disputes: conciliation, mediation and arbitration. Prerequisites: Economics 201 and 202. Credit may not be obtained for both Economics 361 and 461. [3-0]

465. (1½) *Market Structure.*—Behaviour of the firm in theory and practice; oligopoly conduct as a function of structure; competitive strategies of the modern corporation. Prerequisite: Economics 201 or equivalent. (Credit may not be obtained for both Economics 365 and 465.) [3-0]

466. (1½) *Business Regulation and Public Policy.*—Economic waste attributable to the competitive strategies (including pricing) of the modern corporation; difficulties encountered by attempts to improve industry performance by government regulations; Canadian competition policy. Prerequisite: Economics 465. (Credit may not be obtained for both Economics 365 and 466.) [0-0; 3-0]

471. (1½) *Economics of Nonrenewable Resources.*—Application of economic analysis to the management of nonrenewable natural resources. Emphasis is placed on the economics of alternative energy sources. Other topics include mineral economics, criteria for the optimal use of resources, and measurement of resource scarcity. Prerequisite: Economics 201 or equivalent. (Credit may not be obtained for both Economics 471 and 371.) [3-0; 0-0]

472. (1½) *Economics of Renewable Resources.*—Application of economic analysis to the management of renewable natural resources. Special attention is given to criteria for the optimal use of depleting resources such as forests, fisheries, and water. Other topics include public policy with regard to environmental quality, conservation, and outdoor recreation. Prerequisites: Economics 201 or equivalent. (Credit may not be obtained for both Economics 472 and 371.) [0-0; 3-0]

475. (1½) *Regional Economics.*—The concept of a region; location theory; impact analysis; growth theory; regional accounts. Canadian regional economic policy and development. Prerequisites: Economics 201 and 202 or equivalent. [3-0]

480. (1½) *Transportation.*—Economic characteristics of the provision of transportation services, both passenger and freight; the market structure of the industry and the economic impact of the varying degrees of public regulation and promotion within the industry; the role of economic analysis in resolving problems of Canadian policy. Prerequisite: Economics 201; 325 and 326, or Commerce 211 and 212. [3-0]

487. (3) *Comparative Economic Systems.*—Classification of economic systems, evaluation criteria, models of economic systems, co-ordination of economic activities. Centrally planned economies, allocation of resources by physical and price methods, economic growth and fluctuations, sectoral problems, reform and change, varieties of socialism. Other topics may include problems of capitalist market economies, role of government, employment, inflation, income distribution growth, industrial organization, pattern of consumption, relationship between labour and change and succession of economic systems. Prerequisite: Economics 201 or equivalent. [3-0; 3-0]

490. (3) *Applied Economics.*—The application of economic analysis to selected problems and issues. Restricted to economics majors in fourth year, for whom it is compulsory. Prerequisites: (which may not be taken concurrently) Economics 201 and 202 or equivalent; Economics 325 and 326. [3-0; 3-0]

492. (1½/3)**c** *Directed Reading.*

495. (3) *Honours Seminar.*—Reports and group discussions of selected topics. Open only to Honours students. [2-0; 2-0]

499. (3) *Honours Essay.*—Essay on some theoretical or institutional problem. Open only to Fourth-year Honours students.

500. (1½) *Micro-Economics I.*

501. (1½) *Micro-Economics II.*

502. (1½) *Macroeconomics.*

503. (1½) *Economic Fluctuations and Growth.*

515. (1½/3)**d** *Special Topics in Economic Theory.*

517. (1½) *Social Evaluation, Social Choice, and Economic Performance.*

518. (1½) *History of Economic Analysis I.*

519. (1½) *History of Economic Analysis II.*

520. (1½) *Mathematical Economics I.*

521. (1½) *Mathematical Economics II.*

526. (1½) *Probability and Statistics for Use in Economics.*

527. (1½) *Econometric Methods of Economic Research.*

528. (1½) *Econometric Theory.*

529. (1½) *Advanced Econometrics.*

531. (1½) *Economic History of Modern Europe.*

532. (1½) *Economic History of North America.*

541. (1½) *Economic Development I.*

542. (1½) *Economic Development II.*

546. (1½) *Monetary Theory and Policy I.*

547. (1½) *Monetary Theory and Policy II.*

550. (1½) *Government Finance: Expenditures.*

551. (1½) *Government Finance: Revenues.*

553. (1½) *The Economics of Income Security.*

555. (1½) *International Economics I.*

556. (1½) *International Economics II.*

560. (1½) *Economics of Labour.*

561. (1½) *Topics in Industrial Relations.*

565. (1½) *Market Structure and Business Behaviour.*

566. (1½) *Business Performance and Public Policy.*

571. (1½) *Economic Analysis and Natural Resources I.*

572. (1½) *Economic Analysis and Natural Resources II.*

574. (1½) *Special Topics in the Economics of Resource Use.*

575. (1½) *Topics in Location Theory.*

576. (1½) *Urban Economics.*

587. (1½) *Comparative Economic Systems.*

590. (1-3)**d** *Special Advanced Course.*

592. (1-3)**c** *Directed Reading.*

594. (3) *Applied Economics.*

599. (3/6)**c** *Master's Thesis.*

690. (1-3)**d** *Workshops in Economics.*—Workshops on current research topics will be offered in several fields in economics each year. Advanced graduate students may enrol in workshops for credit with permission of the workshop chairman. A list of workshops offered each year will be available from the office of the Department of Economics.

699. *Ph.D. Thesis.*

Economic History—See Faculty of Arts—Departments of Economics and History.

Education (Faculty of Education)—See also:

Adult Education
Art Education
Business Education
Communications Media and Technology
Computing Studies Education
Counselling Psychology
Curriculum and Instructional Studies
Education of Young Children
Educational Administration
Educational Psychology
Educational Studies
English Education
Higher Education
Home Economics Education
Industrial Education
Library Education
Mathematics Education
Modern Languages Education
Music Education
Reading Education
Science Education
Social Studies Education
Special Education

140. (1½) *Introduction to Native Indian Studies.*—Selected issues affecting B.C. Indians; the cultural and historical antecedents to these issues; Indian viewpoints towards these issues. The course draws from various disciplines as well as from the knowledge of Indian resource people. [3-0; 0-0] or [0-0; 3-0]

141. (1½) *Cultural Studies.*—The study of a native Indian cultural group with an emphasis on traditional values and practices related to education. (For students in the Native Indian Teacher Education Program only.) [0-0; 3-0]

197. (0) *Elementary Program (Regular and Special Education) Seminar.*—Group guidance, counselling, and orientation to teaching, including half day observation in schools.

198. (0) *Secondary Program (Regular) Seminar.*—Group guidance, counselling and orientation to secondary teacher preparation. (First term).

240. (1½) *Issues in Native Indian Education.*—Selected issues in Indian education; the relation of these issues to the past; Indian viewpoints towards these issues; introduction to the evaluation and adaptation of teaching resources related to native Indians. [3-0; 0-0] or [0-0; 3-0]

297. (0) *Elementary Program Seminar and Student Teaching.*—Seminars as arranged. Half-day per week classroom experience in elementary schools in-term. Post-sessional practicum for a minimum of three weeks in an elementary school (not required of students in Special Education).

298. (0) *Secondary Program (Regular and Transfer) Seminar and Student Teaching.*—Seminars as arranged. Half-day observation and participation in secondary schools on a weekly basis in-term and a minimum of three weeks post-sessional practicum in a secondary school. Demonstration lessons and field trips as arranged. Individual assistance from faculty adviser. Required in second or third year.

306. (3) *Modern Health Concepts and the Teacher.*—A functional approach to matters related to the total health of the child, motivation for health behaviour, development of attitudes to personal and community health, health education in schools, deviations from normal health, social problems, controversial issues, community health and safety concepts; need for close working relationships between home, school and community; public health agencies, world health organizations. [3-0; 3-0]

325. (1) *Curriculum and Instruction in Physical Education.*—A study of (a) the curriculum organization in physical education for the elementary grades; (b) techniques of instruction in physical education for these grades. [2-2; or 2-2]

326. (3) *Physical Education.*—Theory and practice of dance, games and gymnastics for the elementary school. [2-2; 2-2]

339. (1½) *Canadian Studies in the School Curriculum.*—Designed to improve teaching about Canada in the B.C. curriculum, focussing on Canadian Studies as an area study requiring the integration of material from several disciplines. Critical approaches to the selection, content, materials and appropriate teaching methods, and examination of significant teaching issues. Prerequisite: a minimum of nine units of senior course work from the Faculty of Arts list in Canadian Studies. [3-0; 0-0] or [0-0; 3-0]

342. (3) *Teaching Native Languages in Elementary Schools.*—Strategies, materials and programs for teaching Native Indian Languages as first and second languages. Prerequisite: One of English Education 489, Linguistics 200 or 400. Recommended pre- or co-requisite: English Education 486. Linguistics 433. [3-0; 3-0]

380. (3) *Outdoor Environmental Studies.*—Direct learning experiences concerning man's physical environment, his adaptation to it and his inevitable changing of it. The sites chosen will determine the details of the curriculum. Instructional techniques for working with children in any outdoor site away from the classroom will be developed. Field trips, some overnight, will be an integral part of the course. Transportation and living expenses related to these trips will be borne by the students. [1-4; 1-4]

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395. (1½/3) *Regional Field Studies in Education.*—Directed study of a particular aspect of education in other countries and other cultures. Each field study will consist of a balanced program of study, travel, and community experience. Not offered on a regular basis. Prerequisite: 6 units of course work approved by the Director of the Undergraduate Studies Office as being appropriate to the particular study.

397. (0) *Elementary Program (Regular and Transfer) Seminar and Student Teaching.*—Seminars as arranged. Periods of elementary school teaching practice in the first and second terms. Demonstration lessons and field trips as arranged. Individual assistance from faculty adviser. Post-sessional practicum for a minimum of three weeks required for Transfer students, and may be required for Regular students. Students in the B.Ed. (Special Education) are required to do the May practicum only.

398. (0) *Secondary Program (Industrial Education) Seminar and Student Teaching.*—Seminars as arranged. One week in school observation plus seven weeks of student teaching.

399. (0) *Field Experience and Practice.*—For those undertaking postgraduate study in Education.

404. (3) *Curriculum and Instruction in Physical Education (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in physical education, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]

413. (1½) *Emerging Trends in Secondary Education.*—Approaches to secondary education as a field of inquiry; levels and agents of educational policy-making; patterns of secondary school organization; organization of the curriculum; the materials of inquiry; technologies; the professionalization of teachers; the dynamics of change. [3-0; or 3-0]

432. (3) *The Supervision of Teaching.*—Recent research on teaching effectiveness. The analysis of teaching. Clinical supervision of teaching. Enrolment limited to persons with teaching or supervisory experience. [3-0; 3-0]

440. (1½/3)**d** *Special Study in a Subject-Matter Field.*—Topics in a subject field relevant to secondary teaching and not covered in previous undergraduate work. Undergraduate Studies Office approval is required. (Open only to secondary students admitted with an academic deficiency.) Not for credit toward a graduate degree or for undergraduate credit in an academic subject. The subjects are: algebra (1½), art (1½), biology (1½), botany (1½), Canadian studies (1½), chemistry (1½), clothing (1½), computer science (1½), earth and space science (1½), family life (1½), foods (1½), geography (1½), geometry (1½), history (1½), industrial education internship (3), physics (1½), social studies (3), zoology (1½).

449. (1½/3)**c** *Supervised Study.*—This course is available only to outstanding students approved by the Associate Dean (Teacher Education) in their senior years to undertake a research investigation into a particular problem.

479. (3) *Cross-Cultural Education (Native Indians).*—Instructional techniques for adapting teaching to the needs of Indian students; methods of enriching the curriculum by including the cultural background of all students; the course will include some examination of the anthropological, sociological and historical background of native Indians with an emphasis on contemporary situations as these relate to teaching. Faculty members of various University departments will present the course. [3-0; 3-0]

490. (1½/3)**d** *Special Studies in Education.*—Topics in education not covered in a course. A pilot course may be offered under this name for only one year and with permission of the Director of the Undergraduate Studies Office.

492. (3/6)**d** *Critical Analysis of Teaching.*—A combined clinical and research-based examination of teaching which seeks to help teachers determine what kinds of teaching activities are appropriate to the context in which they are involved. Teaching practice in a public elementary or secondary school is an integral part of this course.

497. (0) *Elementary Program (Regular) Seminar and Student Teaching.*—Seminars as arranged. Post-sessional practicum for a minimum of three weeks in an elementary school.

497. (0) *Elementary Program (One-year Graduate Transfers and B.Ed. (Special Education) students). Seminar and Student Teaching.*—Seminars as arranged. Periods of teaching practice in the first and second terms plus a minimum of three weeks post-sessional practicum in elementary schools. Demonstration lessons and field trips as arranged. Individual assistance from faculty adviser.

498. (0) *Secondary Program (Regular and Transfer) Seminar and Student Teaching.*—Seminars as arranged. Post-sessional practicum (minimum of three weeks) in a secondary school.

499. (0) *Secondary Program (Regular and One-Year Graduate Transfer) Seminar and Student Teaching.*—Seminars as arranged. Periods of student teaching in first and second terms plus a minimum of three weeks post-sessional practicum. Demonstration lessons and field trips as arranged. Individual assistance from faculty adviser. Corequisite: Education 404 in the appropriate teaching field.

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

517. (3) *Health Education in Schools.*—The philosophy, the administration and the teaching of health in schools. School medical service, the healthful school environment. Methods and materials of teaching in schools from Grade 1 through secondary school.

561. (1½-6)**c** *Laboratory Practicum.*

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

566. (3) *Principles of Secondary Education.*—Recent thought on classroom procedures, provisions for individual differences, discipline. The place of various school subjects in total education, and remedial education in Canada and other countries.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

601. (3/6)**c** *Doctoral Seminar.*

699. *Doctoral Thesis.*

Education of Young Children (Faculty of Education)

303. (3) *Curriculum and Instruction in the Language Arts, and Integrated Subjects of the Primary Grades.*—A study of (a) the curriculum organization; (b) techniques of instruction in these grades. [3-0; 3-0]

333. (3) *Curriculum and Instruction for Young Children.*—Planning and developing an educational program for pre-school and Kindergarten children, consideration being given to learning experiences, resources, materials, teaching, and guidance procedures. Practical field experiences to be arranged individually with instructor. [2-2; 2-2]

334. (3) *The Role of the Teacher in Home and Community.*—A study of the philosophy, history and problems of the parent-teacher partnership; development of effective cooperation through individual parent-teacher conferences and parent-group discussions; examination of community services and inter-professional relationships on behalf of children. [3-0; 3-0]

336. (3) *Modern Theories of Early Childhood Education.*—A critical examination of the sources and impacts which are reflected in present educational practice. [3-0; 3-0]

405. (3) *Curriculum and Instruction in the Primary Grades (Advanced).*—Current research findings; trends and problems dealing with personality development, classroom management, and the program of instruction in grades one, two, and three, with reference to readiness in the kindergarten. [3-0; 3-0]

433. (3) *The Kindergarten Year.* —The development of kindergarten programs with reference to facilities appropriate for the developmental stages of the children. The kindergarten in contemporary society; its function for children, parents, and teachers. [3-0; 3-0]

438. (1½/3)**c** *Observation and Recording.*—Observation and recording of behaviour of young children with a view to developing professional skills in the interpretation and uses of data in the educational guidance of young children. Prerequisite: Educational Psychology 331. [2-1; 2-1]

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

561. (1½-6)**c** *Laboratory Practicum.*

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

585. (1½-3)**d** *Advanced Seminar on Research in Early Childhood Education.*—Prerequisites: Any six units of Education of Young Children 333, 334, 336.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma programs.

599. (3/6)**c** *Master's Thesis.*

Educational Administration (Faculty of Education)

460. (3) *An Introduction to Educational Administration.*—Historical, social and conceptual views of administration, administrative theory, purposes, functions and tasks. [3-0; 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

551. (3) *Foundations for Inquiry in Educational Administration.*

552. (3) *Basic Contributions to Administrative Thought.*

553. (3) *Seminar and Group Inquiry in Educational Administration.*

554. (1½/3)**d** *Administration and Educational Policy Development.*—Prerequisite: Educational Administration 460.

555. (1½) *Educational Finance.*

556. (1½) *Administration of the Educational Program.*

557. (1½) *Administration of the Elementary School.* —Prerequisite: Educational Administration 556.

558. (1½) *Administration of the Secondary School.*—Prerequisite: Educational Administration 556.

560. (1½) *School Law.*

561. (1½-6)**c** *Laboratory Practicum.*

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

567. (1½) *Computers and Educational Administration.*—Administrative applications of computers and their organizational implications in educational administration. Prerequisites: EADM 460, ADED 516, HIED 511, or equivalents.

576. (1½-3)**d** *Seminar in the Supervision of Instruction.*—Prerequisite: Educational Administration 460.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

601. (3/6)**c** *Doctoral Seminar.*

699. *Doctoral Thesis.*

Educational Psychology (Faculty of Education)

301. (1½) *Introduction to Educational Psychology.* [3-0; or 3-0]

302. (1½) *Introduction to Educational Evaluation.* [3-0; or 3-0]

310. (1½) *Growth and Development.*—Research as it applies to the elementary school child. Not open to students who have taken Educational Psychology 331. [3-0; or 3-0]

311. (1½) *The Nature and Measurement of Learning.*—A study of learning and the techniques of evaluation as they apply to the elementary school child. Not open to students who have taken Educational Psychology 331. [3-0; or 3-0]

331. (3) *Human Development.*—Consideration of the interaction of genetic and environmental factors as they influence personality, acquisition of language, motor, social and cognitive learning with implications for the organization, administration, and teaching of early childhood years. Not open to students who have taken Educational Psychology 310 and 311. [3-0; 3-0]

332. (3) *Psychology of Adolescence.*—Development and adjustment. [3-0; 3-0]

401. (1½) *Instructional Design.*—Principles of instructional design and their application to the development, analysis, and evaluation of instructional plans for selected settings, instructional formats, and age groupings of learners. [3-0; or 3-0]

428. (1½) *Mental Health in the School.*—Appraisal of current concepts of mental health. Mental health hazards; prevention and treatment. Roles of the teacher and other school personnel. [3-0; or 3-0]

434. (1½/3)**c** *Precision Teaching and Behaviour Management.*—A study of the rationale for precision teaching. The development of skills in measurement and planning implicit in precision teaching that enable teachers and pupils to increase their effectiveness in the classroom. Prerequisite: Educational Psychology 301 or 311. [0-0; 3-0]

435. (1½) *Introduction to the Study of Individuals and Groups.*—An exploration of self awareness in relation to the classroom and other groups. [2-2; or 2-2]

461. (1½/3)**c** *Educational Diagnosis and Remedial Instruction.*—Interpretation of informal and standardized test scores in educational diagnosis; estimates of actual and optimum levels of individual achievement; individual differences as factors affecting performance; methods of encouraging the optimum achievement of individuals; methods and practice materials for remedial teaching. Students intending to take both Educational Psychology 461 and Reading Education 305 or 472/474 should take Reading Education 305 or 472/474 prior to Educational Psychology 461. [3-0; 3-0]

462. (1½/3)**c** *Human Development in Education.*—Investigates selected concepts of developmental theory in terms of their influence upon instructional practice. Particular emphasis is placed on social and intellectual development. Prerequisite: Educational Psychology 310, 331, or 332. [3-0; 3-0] or [3-0; 0-0]

481. (1½) *Introduction to Research in Education.*—The nature of scientific study and essentials of survey and experimental research designs. Designed for students proceeding to graduate work. [3-0; 0-0] or [0-0; 3-0]

482. (1½) *Introduction to Statistics for Research in Education.*—Basic concepts and principles of descriptive and inferential statistics. Designed for students proceeding to graduate work involving quantitative methodology. Prerequisite: Proficiency in modern high school algebra. [3-0; 0-0]

483. (1½) *Statistics in Education.*—Topical survey of various statistical methods used in research in Education. Designed to prepare students to read literature of empirical research. May not be used as prerequisite to Educational Psychology 592. [3-0; 0-0]

484. (1½) *Nonparametric and Related Statistics.*—Distribution-free statistical techniques for analysis of ranked data, and analysis of discrete observations. Prerequisite: Educational Psychology 482. [0-0; 3-0]

501. (1½) *Fundamentals of Human Learning and Motivation.*—Surveys theoretical points of view and empirical findings in human learning and motivation. Provides acquaintance with methods of the empirical study of learning and orientation to various areas of specialization. A basic course for graduate majors in learning and an elective for non-majors. Prerequisite: Educational Psychology 301 and 302 or equivalent, (e.g. Psychology 416). May be taken concurrently with Educational Psychology 481 and 482.

502. (1½) *Verbal Learning and Instruction.*—Critical examination of verbal learning theories and research. Processes studied encompass acquisition, retention, and transfer of verbal behaviour, including comprehension of prose materials. Laboratory exercises and practice in deriving implications for instruction. Prerequisite: Educational Psychology 501 and 592.

503. (1½) *Conceptual Learning and Instruction.*—Critical examination of theories and research on concept learning and reasoning processes, as involved in concept acquisition, thinking, and problem solving. Laboratory exercises and practice in deriving implications for instruction. Prerequisite: Educational Psychology 501 and 592.

504. (1½/3)**d** *Special Topics in Learning, Development and Instruction.*—Combines lectures and seminars to investigate a range of specific learning topics, depending on student needs and faculty interests. Topics to include problem-solving, thinking, creativity, language acquisition and utilization, psycho-motor skills, social psychology of learning, influences of social class, influences of individual differences in intellectual and non-intellectual traits, automated instruction (including computer-assisted instruction), etc. Designed to test new ideas in research and to stimulate student originality. Prerequisite: Educational Psychology 501 and consent of instructor. Educational Psychology 502 and 503 strongly suggested.

505. (1½/3)**c** *Special Topics in Human Development and Instruction.*—Investigates a range of developmental topics and their curricular implications, including: stage models of social and cognitive development, competence in children and adolescents, the development of conceptions of space, time, number, causality and the developmental components of individual differences, etc. Prerequisite: A senior course in human development (e.g. Psychology 301, 414 or 511), or demonstrated competence in developmental theory.

506. (1½) *College and University Teaching.*—Designed primarily for graduate students preparing for post-secondary teaching. Study of issues and problems in college and university teaching from the standpoint of research and theory in educational psychology. Principles of learning, technology in instruction, test construction, analysis and use of test results; evaluation of college teaching and resource materials in these fields will receive special consideration. Emphasis will vary depending upon current needs and interests of participants but will include provision for supervised experiences in organizing and evaluating instruction.

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

528. (1½) *Basic Principles of Measurement.*—Test theory, including reliability, generalizability, validity, and other psychometric topics. Prerequisite: Educational Psychology 482, 483, plus introductory course in measurement.

529. (1½) *Test Construction.*—Measurement and scaling principles, and their applications in the construction and validation of measuring instruments (ability, interest, attitude, etc.). Prerequisite: Educational Psychology 528.

535. (1½/3)**d** *Assessment and Interpretive Processes in School Psychology.*—The integration of theory and use of standardized individual tests (other than the Revised Stanford-Binet and Wechsler Intelligence Scales) and other forms of assessment related to educational diagnosis and program adaptation.

536. (1½/3)**d** *Individual Intelligence Tests.*—Issues concerning the nature and measurement of intelligence with emphasis on the administration, scoring, and interpretation of individual intelligence tests used in psycho-educational assessments. The 3-unit course provides instruction on the Stanford-Binet, WPPSI, WISC-R, and WAIS. The 1½ unit course will cover Wechsler or Stanford-Binet and other current tests. Consult instructor for current offerings.

561. (1½-6)**c** *Laboratory Practicum.*

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

571. (1½/3)**c** *Seminar in Research in Education Psychology and Special Education.*—Prerequisite: Educational Psychology 501 or approved senior course.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

581. (1½/3)**d** *Special Topics in Research Design and Analysis.*—Topics vary depending on students' needs, and the special interests and competencies of faculty. Includes laboratory and other practical experience. Prerequisite: Educational Psychology 481 and 482.

584. (3) *Human Development: Self Processes in Education.*—An intensive analysis of theory and research findings related to changing self understandings during the years of formal education; the effects of self understandings upon academic achievement; techniques of measurement of self-concept. Prerequisites: six units of courses dealing with human development and/or personality theory: e.g. Educational Psychology 310; 331; 332; Psychology 206; 305; 402.

592. (1½) *Design and Analysis in Educational Research I.*—Analysis of variance and covariance with one covariate, including various analyses via linear contrasts. Prerequisite: Educational Psychology 482.

596. (1½) *Design and Analysis in Educational Research II.*—Correlation, including partial, multiple, and curvilinear; regression methods in testing linear hypotheses; extended treatment of analysis of variance and covariance. Prerequisite: Educational Psychology 592.

597. (1½) *Factor Analysis and its Application to Behavioural Sciences.*—Understanding of data reduction methods with multivariate observations, meaningful interpretation of extracted factors in the area of behavioural research. Laboratory exercises will be required. Prerequisite: Educational Psychology 596.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

601. (3/6)**c** *Doctoral Seminar.*

630. (1½) *Advanced Human Learning and Instruction.*—Systematic examination of theory and research findings in applied human learning. A seminar course for advanced graduate students. May be taken concurrently with an individual research project; this course is designed as a test laboratory for dissertation proposals. Prerequisites: Educational Psychology 502 and 503. Educational Psychology 682 recommended.

682. (1½) *Multivariate Analysis in Behavioural Research.*—Multivariate analysis of variance and covariance, discriminant analysis, and canonical analysis. Prerequisite: Educational Psychology 592 and familiarity with matrix algebra.

699. *Doctoral Thesis.*

Educational Studies (Faculty of Education)

200. (3) *Introduction to Education.*—Selected readings in the philosophy, history and sociology of education designed to provide an understanding of the nature, purposes, techniques and organization of education. [3-0; 3-0]

400. (3) *Philosophy of Education.*—An introductory course in which consideration is given to the philosophical foundations of education and to the practical bearings of theory upon curriculum content and classroom practice in our schools. [3-0; 3-0]

407. (3/6)**d** *The Social Foundations of Education.*—An application of the social sciences to the study of education.

430. (3) *History of Education.*—An examination of selected topics in the history of European, Canadian and American education and of the relationships between historical developments and current educational policy. [3-0; 3-0]

468. (1½/3)**c** *Introduction to the Foundations of Values Education*.—Examination of the key concepts, knowledge and techniques produced by disciplines for the study of the theory and practice of values education. Insights provided by history, philosophy, sociology and psychology will be studied. [3-0; 3-0]

470. (3) *Educational Sociology*.—Factors related to the social structure of modern western civilization which have significant relevance to education and to the educability of children. [3-0; 3-0]

500. (1½/3)**c** *Readings in the History of Canadian Education*.

501. (1½/3)**c** *Readings in the History of American Education*.

502. (1½/3)**c** *Readings in the History of Childhood*.

504. (1½/3)**c** *Readings in the History of Educational Policy*.

507. (3-6)**d** *Seminar in the History of Education*.

508. (1½-6)**c** *Review of Research in Educational Methods*.—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

520. (1½) *Educational Policy in Historical Perspective*.—An historical examination of selected issues in current educational policy. Prerequisite: A senior course in history or history of education.

523. (1½/3)**d** *Comparative Education*.—Comparative analysis of the social, economic, and political determinants of the organization and administration of selected foreign educational systems. Prerequisite: At least one of: Educational Studies 400, 430, or 470.

524. (3) *Advanced Seminar in Comparative Education*.

561. (1½-6)**c** *Laboratory Practicum*.

565. (1½/3)**d** *Special Course in Subject Matter Field*.—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

570. (3) *Seminar in Sociology of Education*.—Examination of current research literature and theoretical issues in the area of the sociology of education. Prerequisite: Education 470.

573. (1½) *Sociology of the Curriculum*.—Curriculum in its social, economic, political and institutional contexts.

574. (1½) *Schoolteaching: An Occupational Analysis*.—Examination of teaching as an occupation utilizing the sociology of work perspective.

575. (1½) *Seminar on Work and Education*.—Examination of the relationship between the organization of work and the organization of schools. Education and economic inequality, education and economic growth, vocational education, the transition from school to work and career awareness education.

576. (1½) *Seminar on Women and Education*.—Analysis of the way education reflects and influences the position of women in society. Representation and portrayal of women in the curriculum, the impact of feminism on educational research and practice, the role of women as teachers and mothers, sex role socialization and education for work.

577. (1½) *The Social Context of Educational Policy*.—An examination of selected educational policies and their relation to the social contexts in which they arise emphasizing Canadian society.

580. (1½-6)**c** *Problems in Education*.—Investigation and report of a problem.

587. (1½) *Social Philosophies and Education*.—Prerequisite: Educational Studies 400 or 470.

591. (1½/3)**d** *Epistemological Foundations of the Curriculum*.—An inquiry into the nature and organization of knowledge. Implications for curriculum construction and classroom teaching. Prerequisite: Educational Studies 400 or a senior level philosophy course.

592. (1½/3)**d** *The Conceptual Foundations of Teaching*.—Analysis and study of the informal logic of teaching activities. Prerequisite: EDST 400 or PHIL 250 or 302.

593. (1½/3)**d** *Ethical Foundations of Educational Thought and Practice*.—Inquiry into the nature of moral reasoning and its place in education. Implications for moral education, and the formulation of policy statements. Prerequisite: Educational Studies 400 or a senior philosophy course.

594. (1½) *Philosophy of Educational Research*.—Philosophical analysis of the conceptual structures and research methodologies of current educational research programs. Prerequisite: Educational Studies 400 or a senior philosophy course.

595. (1½) *Analysis of Educational Concepts*.—The theory and practice of conceptual analysis and its application in philosophy of education. Prerequisites: Educational Studies 400 or a senior philosophy course.

596. (1½/3)**c** *Philosophy and Educational Policy*.—Philosophical examination of educational policy issues and the grounds relevant to their resolution. Prerequisite: Educational Studies 400, 430 or 470.

597. (1½) *Theories of Education*.—An examination of the theories of education of such theorists as Plato, Comenius, Pestalozzi, Herbart, Froebel, Dewey, Kilpatrick, Bruner, and Friere. Prerequisite: EDST 400, 430, or 470.

598. (1½/3)**c** *Advanced Seminar in Philosophy of Education*.—Current trends in educational philosophy; social implications of current educational theories. Prerequisite: Educational Studies 400, or a senior level philosophy course.

599. (3/6)**c** *Master's Thesis*.

601. (3/6)**c** *Doctoral Seminar*.

699. *Doctoral Thesis*.

Electrical Engineering (Faculty of Applied Science)

***Not open to students in Electrical Engineering.**

251. (1) *Circuit Analysis I*.—The fundamentals of analysis of lumped linear time-invariant circuits; network theorems; first and second-order circuits; transfer functions. [2-0-1; 0-0-0]

252. (1½) *Introduction to Solid State Devices*.—Elementary theory of semi-conductors and the physics of pn junction diodes and transistors. [2-2*-1; 0-0-0]

253. (1½) *Circuit Analysis II*.—Phasor analysis; resonance phenomena; poles and zeros; transfer function representation; two-port parameters; applications of Fourier series and Laplace transforms to circuit analysis. [0-0-0; 2-2*-1]

254. (1½) *Electronic Circuits I*.—Nonlinear circuits, assumed state analysis; power supplies, filtering; transistor models and circuits; SCR circuits. [0-0-0; 2-2*-1]

256. (1½) *Switching Circuits*.—An introduction to Boolean Algebra and logical circuits. Realization of simple sequential machines and their use in digital systems. Elementary computer architecture. [2-2*-1; 0-0-0]

258. (1) *Computer Methods in Systems Analysis and Design*.—Models for electrical engineering problems; numerical methods for analysis and design using static and dynamic models; model identification. [2-0-1; 0-0-0]

261. (1½) *Engineering Electromagnetics*.—Electrostatics, electric currents, dielectrics, capacitance, electrostatic potential, magnetostatics. [0-0-0; 3-0-1]

*263. (1½) *Applied Electrical Circuits and Devices*.—DC and AC circuits; transformers and electrical machines; electronic devices and instrumentation; control systems; computers. [2-2*-1; 0-0-0] or [0-0-0; 2-2*-1]

352. (1½) *Electrical Engineering Materials*.—Elementary aspects of structure and properties of materials relevant to device applications. Dielectrics, ferrolectrics, ferrites, metals. [0-0-0; 2-2*-2*]

356. (1½) *Electronic Circuits II*.—Study of analysis and design of electronic circuits. Single and multistage amplifiers; tuned amplifiers; feedback amplifiers and oscillators; operational amplifiers. Limitations of circuit components on circuit performance. [2-3*-2*; 0-0-0]

358. (1½) *Introduction to Microcomputers*.—Organization and operation of microcomputers, memory addressing modes, representation of information, instruction sets, machine and assembly language programming, systems programs, I/O structures, I/O interfacing and I/O programming, introduction to digital system design using microcomputers. [0-0-0; 2-3*-2*]

359. (1½) *Signals and Communications*.—Fourier transform; signal modulation; sampling and multiplexing; analogue and pulse modulation and detection in the presence of noise; discrete time systems response and filtering. [3-0-1;0-0-0]

360. (1½) *Systems and Control*.—Modelling and linear system response; stability; simple feedback control systems; state variables; discrete time control systems; nonlinear systems. [0-0-0; 3-0-1]

362. (1) *Applications of Electromagnetic Fields*.—Maxwell's equations; plane waves; TEM transmission lines; electrostatic boundary value problems. [2-0-2*; 0-0-0]

363. (1½) *Guided Waves and Radiation*.—Waveguides; cavity resonators; radiation; elementary antennas, wave propagation. [0-0-0; 2-2*-2*]

*364. (1½) *Electronic Instruments*.—A course for those with no previous circuits or electronics background, designed to give students some ability to use electronic equipment such as measuring instruments, transducers, amplifiers and digital processors. [0-0-0; 2-2*-2*]

*365. (2) *Applied Electronics*.—Characteristics of transducers and electronic devices; analysis and realization of electronic circuits such as power supplies, amplifiers and logic circuits. Prerequisite: ELEC 263. [0-0-0; 2-2*-2*]

*366. (2) *Electronics Theory and Applications*.—Modelling of solid state devices; analysis and design of pulse and digital circuits, linear amplifiers, and operational amplifiers including A/D and D/A converters; electronic systems; introduction to micro-computers. [3-2*-2*; 0-0-0]

367. (1½) *Electrical Measurements and Electronic Instrumentation*.—Measurement of voltage, current, impedance, power, and frequency. Theory of measurements. Analysis of waveforms. Characteristics and application of electronic instruments. Analysis of measurement systems. Fault tracing. Prerequisites: ELEC 251, 253, 254, 256. [2-3*-0; 0-0-0]

368. (1½) *Transducers, and Advanced Instrumentation and Measurement*.—Performance and construction of transducers. Principles of analog and digital measuring instruments. Precision measurement of electrical parameters. Measurement standards. Measurement of force, pressure, displacement, flow, and other physical and chemical parameters. On-line handling of measurement data. Signals in the presence of noise. Interface standards. Calibration. Prerequisites: ELEC 252, 359, 367, 360 (concurrent), ELEC 352 (concurrent). [0-0-0; 2-3*-1]

*370. (1½) *Electrical Machines and Power Transmission*.—A study of the basic types of electric motors and generators, transformers, rectifiers and inverters; electrical power measurements; distribution of electrical energy. Prerequisite: ELEC 263 or ELEC 251. [0-0-0; 2-2*-2*]

371. (1½) *Power Circuits and Devices*.—Magnetic circuits. Design and analysis of transformers and actuators. Per unit system. Three phase circuits. Introduction to solid state power converters. [2-3*-1; 0-0-0]

372. (1½) *Rotating Machines*.—Design and analysis of dc, induction and synchronous machines. Use of stepper motors. Introduction to machine controls. [0-0-0; 2-3*-1*]

*451. (3) *Electrical Circuits and Apparatus*.—D.C. and A.C. circuits and machinery; theory and application of electronic devices. [2-2*-2*; 2-2*-2*]

455. (3) *Communication Systems*.—Formulation of the communication problem, signal characterization, transformation of signals by systems; detection and estimation of signals in noise, performance calculations and optimization of amplitude, angle, and pulse modulation systems, signal multiplexing. [2-0-2; 2-0-2]

456. (1½) *Computer Communications*.—Analysis, design and implementation of computer networks and their protocols. Overview of the OSI 7-layer model of protocols. Prerequisite: Computer Science 313 or Electrical Engineering 358, and Math 205 or Math 251. (Same as CPSC 417.) [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

460. (1½) *Control Systems*.—Relationships between system parameters and system responses for linear control systems. Design specifications for dynamic and steady-state performance and realization by use of feedback and compensation networks. Design of Pi, Pd and PID analog and digital controllers. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

461. (1½) *Non-Linear and Optimum Systems*.—Phase plane analysis of on-off motor and temperature controllers. Controller non-linearities and limit cycles. Controller linearization by pulse-rate and pulse-width modulation. The minimum principle and its use in the optimum control of systems. Applications to time-optimal and fuel-optimal systems. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

463. (3) *Power Systems Analysis*.—Power plants, synchronous generators, overhead lines, underground cables, transformers. Automatic generation control, control of voltage and reactive power. Power-flow and short-circuit solutions. High voltage direct current transmission. [2-0-2; 2-0-2]

464. (1½) *Micro/Mini-computer Systems Design*.—System design strategy, role and application of high level languages, I/O interfacing methods — programmed, interrupt-driven, direct memory access, parallel/serial; real-time interrupt driven programming; design of microprogrammed computers and special-purpose controllers; microcomputer memory system design; data acquisition and computer controlled systems. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

466. (1½) *Digital Signal Processing Systems*.—This course covers the design of digital signal processing systems and implementation in current LSI components such as microprocessors. Digital filter fundamentals and design techniques (impulse invariant, bilinear transform, windowing, FFT methods) are described. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

468. (1½) *Digital Process Control*.—Discrete systems, z — transform; Sampled data systems; Process control algorithms; Multivariable control; State space methods; Response to stochastic inputs, Wiener and Kalman filtering; Least squares parameter identification. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

469. (3) *Microwave Engineering*.—Advanced theory of transmission lines and waveguides; microwave components; introduction to microwave electronics; microwave solid state devices and circuits; industrial applications of microwaves. [2-0-2; 2-0-2]

470. (1½) *Microwave Circuits*.—Transmission lines; microwave integrated circuit lines; passive microstrip devices; microwave solid state control devices and circuits, amplifiers, oscillators and frequency conversion circuits. [0-0-0; 2-0-2]

473. (3) *Systems Laboratory*.—Experiments on integrated engineering systems. [0-6-0; 0-6-0]

476. (1½) *Introduction to Computer Architecture*. —Control unit structure and microprogramming, memory organization, input-output techniques, microprocessors. Introduction to super-computer and beyond-Von Neumann architectures. Prerequisite: CPSC 313 or ELEC 358. Same as CPSC 413. [3-0-1; 0-0-0] or [0-0-0; 3-0-1]

477. (3) *Solid State Devices*.—Theory of operation and technology of fabrication of solid state semiconductor devices of current interest; e.g. silicon IC's, MOS devices, microwave devices. [2-0-2; 2-0-2]

478. (1½) *Introduction to Computer Graphics*.—Introductory concepts. Mathematics of computer graphics—transformations, algorithmic concepts, representations. Devices for computer graphics-input and output, active and passive. Architecture of graphics systems. Graphical programming languages. Software for computer graphics. Representation of graphical data. High level languages. Current prospects—three dimensional graphics, large data bases, animation, economics, specific application areas. Prerequisites: CPSC 210, or ELEC 358 or permission of Head of Department. (This course is the same as CPSC 414). [3-0-0; 0-0-0]

483. (1½) *Antennas and Propagation*.—Basic antenna concepts; antennas for low, medium and high frequencies; terrestrial and satellite propagation links; environmental effects on electromagnetic radiation. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

484. (1½) *Models of Electrical, Mechanical, Ecological and Feedback Control Systems*.—Techniques for simulating ordinary and partial differential equations on the analog computer. Digital Simulation of continuous and discrete systems. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

486. (1½) *Optimization Methods for Systems Design*.—Numerical methods for the optimization of nonlinear objective functions of one and several variables, with and without constraints. Introduction to linear programming. Applications to system design in Electrical Engineering. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

490. (1½) *Topics in Electrical Engineering I*.—Lectures on subjects of current interest by Visiting Lecturers. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

491. (1½) *Topics in Electrical Engineering II*.—Lectures on subjects of current interest by Visiting Lecturers. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

492. (1½) *Machine Dynamics*.—Equations for transient analysis of electrical machines. Measurement of machine parameters. Computation of nonlinear machine performance. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

493. (1½) *Power Electronics*.—AC-DC, DC-DC, DC-AC, AC-AC Converters. Analysis of idealized circuits with generalized loads. Introduction to applications of practical devices — diodes, thyristors, power transistors and FETs. [2-3*-0; 0-0-0]

494. (1½) *Power System Stability*.—Synchronous machine equations and models. Classical stability analysis; equal-area criterion. Small-disturbance stability; phase-compensated controllers; linear optimal stabilization. Large-disturbance stability counter-measures. Multimachine stability problems. [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

495. (1½) *Industrial Drives*.—Analysis of typical loads. Characteristics and analysis of dc and ac drives. Commercial choices of drive for various applications. Dynamic response of ac and dc drives. Microprocessor-based controllers. Prerequisite: ELEC 493. [0-0-0; 2-3*-0]

498. (1) *Engineering Reports*.—Copies of specifications are issued by the Department during registration.

550. (1) *Topics in Power Electronic Design*.—New devices and applications in power electronics. Prerequisite: ELEC 493.

551. (1½) *Applied Electromagnetic Theory*.—Basic relations, concepts and theorems; Green's functions; transverse electromagnetic waves; transmission lines, cylindrical and surface waveguides; problems involving plane-wave, cylindrical-wave and spherical-wave functions; perturbational and variational techniques and applications; radiation.

552. (1) *Theory of Natural Modes in Multi-Conductor Transmission Lines*.—Matrix form of telegraph equation; physical interpretation of solution through use of matrix calculus. Characteristic impedance, admittance, and propagation coefficient in matrix form. Steady-state application. Transient analysis through the use of the Fourier transform.

553. (1½) *Advanced Power Systems Analysis*.—Computer-oriented analysis of electric power systems with regard to multiphase line constants, steady-state analysis of single and parallel circuits, lightning and switching surges; large-scale solution of power-flow problems; optimal real and reactive power flow.

554. (1½) *Advanced Power System Control and Dynamics*.—Synchronous machine modelling; excitation and speed governor systems; enhancing power system damping through excitation or governor control; linear optimal stabilization of power systems; load shedding, generator dropping and other emergency measures; asynchronous operation and resynchronization; nonlinear stability; power-frequency control.

556. (1) *Optimum Filtering and Control*.—The minimum principle, calculus of variations, and dynamic programming. The minimization of algebraic and functional quadratic forms. Applications to optimum filtering for state and parameter estimation and to the optimization of dynamic systems.

557. (2) *Non-linear Systems*.—Analytical and graphical techniques applied to non-linear and time-varying systems. Stability via Liapunov's Direct Method. Applications to engineering problems.

558. (1½) *Switched Mode Power Supply Design*.—Survey of different configurations. Choice of components. Magnetic component design. Buck converter. Boost converter. Flyback converter. Cuk converter. Resonant converter. Converter modelling and analysis techniques. Stability. Electromagnetic interference problems and shielding. Prerequisite: ELEC 493 or equivalent. Includes project work.

560. (1) *Network Analysis*.—Topological methods of analysis; functional characterization of linear time-invariant networks; stability and realizability criteria; computer-aided design.

562. (1) *Network Synthesis*.—Realizability criteria; synthesis of passive networks; synthesis of active networks; network sensitivity; approximation in time and frequency domains.

564. (1½) *Detection and Estimation of Signals and Patterns*.—Parameter detection and estimation, characterization of signals and message sources, linear mean square estimation of random signals, detection of deterministic signals and patterns in noise, realization of detection and pattern recognition systems.

565. (1) *Data Communications*.—Analysis and design of data networks for electronic information services and computer communications. Queueing analysis of data link response times; circuit, message and packet switching; multiplexing alternatives; modems; effects of data link capacity, link flows and topology on network performance; network operation and management via data link controls, error control, routing and flow control.

566. (1½) *Communication and Information Theory*.—Definition of information, encoding of discrete and continuous message sources, coding for noisy channels, design of modulators and demodulators, optimization of one-way and feedback communication systems.

567. (1) *Privacy and Security in Data Communication Networks*.—Introduction to cryptography and cryptanalysis, information, theoretic approaches to secrecy, NBS data Encryption Standard, applications of encryption in data communication systems for privacy and authentication, public key cryptosystems, fraud and counter-measures in data communication networks. [0-0-0; 2-0-0]

568. (1) *Control Systems*.—State-space analysis of continuous and discrete multivariable systems. Controllability and observability. Sensitivity considerations. Stability of linear and nonlinear systems.

569. (1) *Digital System Applications for the Pulp and Paper Industry*.—A laboratory course restricted to students taking the M.Eng. program in Pulp and Paper Engineering. Topics covered include: microcomputer interfacing for instrumentation and control; high-level programming languages; data logging and signal conditioning; sequential control; process control.

571. (1-2)c *Electrical Engineering Seminar and Special Problems*.

572. (½/1)c *Advanced Topics in Control*.—Studies in areas of current research interest, with written problem assignments.

573. (1½) *Process Control Applications in the Pulp and Paper Industry*.—Discrete process models; response to stochastic inputs; digital process control algorithms; control of paper machines, digesters and other pulp and paper process units. Intended primarily for students registered in the M.Eng. program in Pulp and Paper Engineering.

574. (1) *Self-Tuning Control*.—Adaptive control; system identification; self-tuning control; design and implementation considerations; algorithm convergence and stability; industrial applications.

575. (1) *Signal and Image Processing*.—Analysis and characterization of signals, images and random processes; optical and digital filtering of signals and images for enhancement, recognition, storage and transmission.

576. (1) *Semiconductor Theory for Device Applications*.—A treatment of the structure and electronic properties of semiconducting materials; energy bands; carrier transport mechanisms, scattering processes, amorphous semiconductors. Defects in crystals and ionic transport processes.

577. (1) *Solid State Electronic Devices*.—A treatment of the electrical behaviour and physical properties of solid state devices of current interest, e.g. MOS devices, microwave devices, semiconductor lasers, semiconductor memories, solar cells.

578. (1) *Integrated Circuit Design*.—Computer-aided design, layout and circuit simulation of ICs. Logic simulation. Testability. Architecture of VLSI systems. Process technologies used in IC fabrication and their influence on IC design rules. Students will design ICs which will then be fabricated by a silicon foundry.

579. (1) *Advanced Topics in VLSI Design*.—An advanced course in VLSI design, covering topics of current interest in the areas of chip architecture, CAD tools and techniques for structured design. Prerequisite: ELEC 578 or equivalent.

580. (1) *Fabrication Technology of Semiconductor Devices*.—Theory and operation of high vacuum systems, vacuum deposition techniques, chemical depositon techniques, thermal diffusion, ion implantation, oxidation, metal-semiconductor contacts, integrated circuit technology, thin film, thick film, hybrid microelectronics.

581. (1) *Optical Solid State Devices*.—Electro- and acousto-optic deflectors and modulators. Hologram storage materials. Image storage and processing devices. Display devices. Optical properties of materials.

583. (2) *Microwave Measurements and Techniques*.—Theory and techniques for the measurement of wavelength and frequency, impedance, attenuation, Q-factor, power, receiver and transmitter characteristics, antenna characteristics and properties of materials.

585. (1) *Antennas and Diffraction*.—Antenna analysis by Kirchhoff diffraction theory with applications; near and far field radiation patterns; rigorous diffraction theory, the geometrical theory of diffraction and its application to antennas.

588. (1) *Biomedical Signals and Systems Analysis*.—Modelling and analysis of biological control systems and prostheses.

589. (1) *System Design for Robots and Teleoperators*.—Requirements and methods for computer control of manipulator systems; computer simulation of mechanical linkages and actuator systems. Computer architectures suitable for manipulator control in robots and teleoperators. Prior taking of MECH 563 is recommended.

590. (1) *Speech Analysis and Synthesis*.—Analysis and characterization of speech signals. Microprocessor techniques for analyzing and synthesizing speech waveforms; speech recognition.

591. (1) *Engineering Applications of Analogue and Hybrid Computers*.—Programming of system equations, optimization techniques, application to the study of control systems.

592. (1) *Digital Electronic Systems Design*.—Overview of advanced digital design technology for combinational and sequential systems. Microcontrollers, parallel processing configurations and adaptive processors. Subsystem coordination via busing and higher level decision making.

593. (1½) *Advanced Computer Graphics*.—This course is the same as Computer Science 514.

594. (1) *Realtime Digital Systems Software*.—Multi-tasking realtime software design, interrupt-driven systems, hardware/software tradeoffs, theory of realtime task scheduling, task communication and synchronization techniques, methods of memory management for realtime mini and microcomputer based systems.

595. (1) *Parallel Processing and Advanced Computer Architectures*.—Identification of parallelism, optimal and sub-optimal concurrency scheduling, deadlocks, Petri networks and other models of parallelism, data flow machines, systolic arrays, pipeline and array processors, other parallel architectures, interconnection networks, intelligent memory systems.

596. (1) *Optical Signal Processing*.—The optical system as a two-dimensional linear system. Diffraction theory. Optical systems for image formation, data processing and interferometry. Holography and some of its engineering applications.

597. (3) *Project in Pulp and Paper Engineering*.—Project report on assigned topic of specialization. For students registered in the M.Eng. program in Pulp and Paper Engineering, where project is supervised by a faculty member of the Department of Electrical Engineering.

599. (6) *Thesis*.—For M.A.Sc. degree.

699. *Thesis*.—For Ph.D. degree.

English (Faculty of Arts)

100. (3) *Literature and Composition*.—A study of the principles of composition and of some examples of drama, short story, poetry and novel. Essays and exercises are required. [3-0; 3-0]

201. (3) *Major Authors to 1914*.—A survey of the major English writers, focusing on Chaucer, Shakespeare, and Milton in the first term, and in the second term on seven later writers, including two novelists. Essays are required. Prerequisite: English 100 or Arts I. [3-0; 3-0]

202. (3) *Introduction to Canadian Literature*.—The major types of Canadian writing: novel, short story, poetry, non-fictional prose, and humour. Essays are required. Prerequisite: English 100 or Arts I. [3-0; 3-0]

203. (3) *Biblical and Classical Backgrounds of English Literature*.—The main biblical texts and classical myths, and their use in English works. Essays are required. Prerequisite: English 100 or Arts I. [3-0; 3-0]

204. (1½) *Short Fiction*.—The short story and novella in the nineteenth and twentieth centuries, with some material from earlier periods. Essays are required. Prerequisite: English 100 or Arts I. [3-0]

205. (1½) *Introduction to Poetry*.—Principles, methods, and resources for developing an appreciation of poetry. Essays are required. Prerequisite: English 100 or Arts I. [3-0]

206. (1½) *Introduction to Drama*.—Principles, methods, and resources for developing an appreciation of drama. Essays are required. Prerequisite: English 100 or Arts I. [3-0]

207. (1½) *Introduction to the Novel*.—Principles, methods, and resources for developing an appreciation of the novel. Essays are required. Prerequisite: English 100 or Arts I. [3-0]

208. (3) *Introduction to American Literature*.—The major types of American writing: novel, poetry, drama, short story, and non-fictional prose. Essays are required. Prerequisite: English 100 or Arts I. [3-0; 3-0]

210. (3) *An Introduction to English Honours*.—For prospective Honours students accepted by the English Honours Committee on the recommendation of the instructor. Students permitted to take this course must take English 211 concurrently. [3-0; 3-0]

211. (3) *Seminar for English Honours*.—An introduction to practical criticism; required of and open only to students of English 210. A limited number of texts from a range of genres and periods will be chosen for close critical analysis. [3-0; 3-0]

301. (1½) *Practical Writing*.—Study of the principles of written communication in general business and professional activities, and practice in the preparation of abstracts, proposals, reports, and correspondence. Prerequisite: English 100 or Arts I. [3-0]

302. (1½) *Advanced Practical Writing*.—Library research in the student's professional field; the writing of articles and research papers; detailed preparation in term- or graduating-essays required in a number of departments and faculties. Attention will be given to appropriate style as well as correct expression. Prerequisite: English 301 or permission of course chairman. [0-0; 3-0]

303. (3) *Intermediate Composition*.—Study of the principles and extensive practice in the writing of effective prose, from arrangement and punctuation to various stylistic strategies. May be taken in the second year. Prerequisite: English 100 or Arts I. [3-0; 3-0]

304. (3) *Advanced Composition*.—Special emphasis on rhetoric, with a focus on audience, authorial voice, and range of style. [3-0; 3-0]

306. (3) *History and Theory of Rhetoric*.—Major theories of rhetoric studied chronologically with particular emphasis on the relationship between traditional and modern theories. [3-0; 3-0]

307. (1½) *Studies in Rhetoric*.—Topics in rhetorical theories and their application. [3-0]

310. (3) *Classics of European Literature*.—Aspects of the Western literary tradition from its beginnings to the twentieth century. Major representative texts in translation and their relevance to English literature. [3-0; 3-0]

311. (3) *Literature of the Bible*.—Origins and backgrounds of biblical literature; the principal translations of the Bible into English; an examination of the chief literary forms of the Bible: poetry, drama, biography, short story, etc.; influence of the Bible on English language and literature. [3-0; 3-0]

312. (1½/3)**d** *Studies in Poetry*.—Critical studies of representative English poems grouped according to form and content. [3-0] or [3-0; 3-0]

313. (1½/3)**d** *Studies in Drama*.—One-term or full-year course on particular periods, topics, or dramatic genres, focusing on close reading of appropriate texts. Specific topics will be announced each year. [3-0] or [3-0; 3-0]

314. (1½/3)**d** *Studies in Fiction*.—Special topics involving thematic, generic, or formal approaches to fiction. [3-0] or [3-0; 3-0]

315. (1½/3)**d** *Studies in Non-Fictional Prose*.—Special topics such as types of non-fictional prose, the prose of individual periods, developments in prose style. [3-0] or [3-0; 3-0]

316. (1½) *Studies in Literature and the Other Arts*.—Ways in which writers and artists in other media deal with common themes; problems in formal and stylistic relationships between literature and other arts. Specific topics will be announced each year. [3-0]

317. (1½) *Studies in Comparative Aspects of English Literature*.—Relationships between different national literatures in English; perhaps also thematic and formal influences of other literatures upon literature in English. Specific topics will be announced each year. [3-0]

318. (1½) *Children's Literature*.—A study of selected works from children's literature of the last three centuries; connections between children's literature and the adult cultural tradition. [3-0]

319. (1½/3)**d** *Studies in the Intellectual Backgrounds of Literature*.—Special topics in the history of ideas, with particular reference to ideas that illuminate or are embodied in literature. [3-0] or [3-0; 3-0]

320. (3) *History of the English Language*.—Development of the English language from the West Germanic to the present; phonology, morphology, syntax, and vocabulary. [3-0; 3-0]

322. (1½) *Stylistic Variation*.—The application of linguistic theory and method to the stylistic analysis of English literary texts. Prerequisite: English 329. [3-0; 0-0]

323. (1½) *Dialectal Variation*.—Geographical and social variation in English, and the representation thereof in literary texts. Prerequisite: English 329. [0-0; 3-0]

324. (1½) *Literary Semantics*.—The relation and application of semantic principles to literary theory and interpretation. An introductory course in linguistics or English language is recommended. [3-0]

325. (1½) *History of the English Language*.—For Honours students. [3-0]

326. (1½) *Studies in the English Language*.—Intensive study of some topic or aspect of English language. Specific topics will be announced each year. [3-0]

329. (3) *The Structure of Modern English*.—A description of English phonetics, phonology, grammar, and vocabulary. Open to second-year students. [3-0; 3-0]

330. (1½/3)**d** *Practical Criticism*.—Exercises in criticism involving various critical approaches to literature. A limited number of texts will be examined closely. [3-0] or [3-0; 3-0]

331. (3) *History of Criticism*.—Exploration of seminal statements about the purpose, scope, and methods of literary criticism, and the nature and inter-relationships of literary theme, form, and genre. [3-0; 3-0]

332. (3) *Modern Critical Theories*.—A review of modern trends, with some emphasis on practical criticism. [3-0; 3-0]

335. (1½/3)**d** *Studies in Major Authors*.—The works of no more than two significant writers will be examined. Specific topics will be announced each year. [3-0] or [3-0; 3-0]

336. (1½) *Studies in Criticism and Bibliography*.—Topics in these fields, including criticism in individual periods, individual critics, and bookmaking and documentation. [3-0]

337. (1½/3)**d** *Studies in Fantasy*.—A study of fantasy in fiction, drama, and poetry, which may include topics such as science fiction, the gothic novel, and utopian literature. [3-0) or [3-0; 3-0]

340. (1½) *Introduction to Old English*.—Old English grammar, with readings in the prose of the period. [3-0; 0-0]

341. (1½) *Old English Poetry*.—A survey with emphasis on *Beowulf*. Prerequisite: English 340. [0-0; 3-0]

345. (1½) *Old English*.—For Honours students. [3-0]

350. (3) *A Survey of Middle-English Literature Excluding Chaucer*. [3-0; 3-0]

351. (1½/3)**d** *Studies in Middle-English Literature*.—Special studies of individual themes, genres, and authors. [3-0] or [3-0; 3-0]

352. (1½) *Middle English*.—The forms and development of the language. [3-0]

353. (1½) *Early English Drama*.—The development of English drama in the Middle Ages. [3-0]

355. (1½/3)**d** *Chaucer*.—A detailed study of Chaucer's major works. [3-0] or [3-0; 3-0]

356. (1½) *Chaucer*.—For Honours students. [3-0]

360. (3) *Sixteenth–Century Literature to 1611*.—The English Renaissance; its literature and some of its formative ideas. [3-0; 3-0]

361. (1½) *Spenser*.—The work of Edmund Spenser with emphasis on *The Faerie Queene*. [3-0]

363. (3) *Tudor and Stuart Drama*.—English drama from the reign of Henry VIII to the closing of the theatres in 1642; emphasis on Elizabethan and Jacobean playwrights. [3-0; 3-0]

365. (3) *Shakespeare*.—Lectures on various aspects of Shakespeare's art. Detailed study of eight plays. [3-0; 3-0]

366. (1½) *Studies in Shakespeare*.—Examination of particular aspects of Shakespeare's writing. Specific topics will be announced. [3-0]

367. (1½) *Shakespeare*.—Intensive study of at least six plays. For Honours students. [3-0]

370. (3) *Seventeenth–Century Literature*.—Prose and poetry, exclusive of Milton. Emphasis upon the ideas, forms, and styles as an expression of the educational, religious, moral, and political controversies of the age. [3-0; 3-0]

371. (1½) *Poetry of the Earlier Seventeenth Century*.—Examination of one or more of the major trends in poetry before 1660: Donne and the metaphysical style; Jonson and the classical style; the Cavalier poets. [3-0]

372. (1½) *Seventeenth–Century Prose*.—The work of one or more of the prose writers from Bacon to Tillotson will be studied in relation to the period and the development of prose style. [3-0]

373. (1½) *Restoration and Eighteenth–Century Drama*. [3-0]

375. (1½/3)**d** *Milton*.—The work of Milton with special emphasis on *Paradise Lost*. [3-0] or [3-0; 3-0]

376. (1½) *Milton*.—For Honours students. [3-0]

380. (3) *Eighteenth–Century Literature*.—The age of Pope and the age of Johnson, including studies of representative authors such as Swift, Gray, Goldsmith, Burns, and Blake. [3-0; 3-0]

381. (1½) *Poetry of the Age of Dryden and Pope*. [3-0]

382. (1½) *Poetry of the Middle and Late Eighteenth Century*.—Developments in poetry from the death of Pope to the end of the century. [3-0]

384. (1½) *The English Novel in the Eighteenth Century*.—The beginnings of the realistic novel and its development from Defoe to Jane Austen. [3-0]

389. (1½/3)**d** *Studies in Eighteenth–Century Thought and Literature*.—Term or full-year course in which systems of thought or other elements of the culture of the period will be studied as they contribute to the interpretation and evaluation of literature. Topics will vary from year to year. [3-0] or [3-0; 3-0]

390. (3) *English Literature of the Nineteenth Century*.—The main movements of prose, poetry, and drama. The Romantic Revival and Romanticism as a continuing force. [3-0; 3-0]

391. (3) *Romantic Poetry*.—Blake, Wordsworth, Coleridge, Byron, Shelley, and Keats. [3-0; 3-0]

392. (3) *Victorian Poetry*.—Tennyson, Browning, and Arnold. A few weeks are devoted to later poetry. [3-0; 3-0]

394. (1½) *The Victorian Novel*.—Developments in the novel from Dickens to Thomas Hardy. [3-0]

400. (3) *Early Modern British Literature*.—Hardy, Hopkins, Butler, Wilde, Wells, Shaw, and Conrad. The background of ideas and social forces, especially as revealed by the literature of the period 1870-1914. [3-0; 3-0]

403. (1½) *Modern British Drama*.—A study of major movements and dramatists from the late nineteenth century to the Second World War. [3-0]

404. (1½) *The Modern British Novel*.—Developments in the novel up to the Second World War. [3-0]

410. (3) *Contemporary British Literature*.—Major figures and trends in English literature between 1914 and 1960; Eliot, Yeats, Joyce, Lawrence, Woolf, Forster, Waugh, Orwell, Auden, and Thomas. [3-0; 3-0]

411. (1½) *Twentieth-Century British Poetry*.—A study of major developments in poetry since the death of Queen Victoria. [3-0]

413. (1½) *Contemporary British Drama*.—A study of movements and major dramatists since the Second World War. [3-0]

414. (1½) *The Contemporary British Novel*.—The novel from the Second World War to the present. [3-0]

416. (1½/3)**d** *Modern Irish Literature*.—Irish literature in English since the Irish Literary Renaissance. [3-0] or [3-0; 3-0]

420. (3) *Canadian Literature*.—A study of the literature in English with some attention to major French-Canadian works in translation. [3-0; 3-0]

421. (3) *Canadian Poetry*.—Technical and historical development of Canadian poetry from the beginnings to the present day, with reference to English and American poetry. [3-0; 3-0]

423. (1½/3)**d** *Canadian Drama*.—Canadian drama in English with some attention to French-Canadian drama in translation. [3-0] or [3-0; 3-0]

424. (3) *Canadian Fiction*.—The short story and the novel in English, with some examples of French-Canadian works in translation. [3-0; 3-0]

426. (1½) *Studies in Canadian Literature*.—Special topics which may include particular periods, individual authors, or material not covered in other courses. Specific topics will be announced each year. [3-0]

429. (1½/3)**d** *Backgrounds of Canadian Literature*.—A study of selected literary texts in relation to the work of essayists, letter-writers, etc., whose writings have contributed to the creation of Canadian literature. [3-0] or [3-0; 3-0]

430. (3) *A Survey of American Literature*.—Major writers and themes from the colonial period to the 1920's. [3-0; 3-0]

431. (1½) *American Poetry to 1900*. [3-0]

432. (1½) *American Poetry of the Twentieth Century*. [3-0]

433. (1½) *American Drama*.—Drama in the United States, with emphasis on the major playwrights of the twentieth century. [3-0]

434. (1½) *American Fiction to 1900*.—Emphasis on the writing of Irving, Poe, Hawthorne, and Melville. [3-0]

435. (1½) *American Fiction in the First Half of the Twentieth Century*.—Major movements and writers. [3-0]

436. (1½/3)**d** *Studies in American Literature*.—Special studies of individual periods or authors or themes. [3-0] or [3-0; 3-0]

437. (1½) *American Fiction from Mid-Twentieth Century to the Present*. [3-0]

438. (1½/3)**d** *Comparative Studies in Canadian and American Literature*.—The study of two national literatures in relation to each other. [3-0] or [3-0; 3-0]

440. (3) *Literature of the Commonwealth*.—A comparative study of the traditions of English literature outside England, particularly of the growth of indigenous literatures (in English) in the countries of the Commonwealth. [3-0; 3-0]

446. (1½) *Studies in Literatures of the Commonwealth*.—Special topics, varying from year to year, including studies of individual authors, genres, and nations. [3-0]

450. (3) *A Critical History of English Literature*.—A survey of movements and writers from Chaucer to the early twentieth century. [3-0; 3-0]

Note: 480-499 are for Honours students only.

480. (1½) *Studies in Medieval English Literature*. [3-0]

481. (1½) *Studies in Renaissance English Literature*. [3-0]

482. (1½) *Studies in the Eighteenth Century*. [3-0]

483. (1½) *Studies in the Nineteenth Century*. [3-0]

484. (1½) *Studies in British Literature of the Twentieth Century*. [3-0]

485. (1½) *Studies in American and Canadian Literature of the Twentieth Century*. [3-0]

486. (1½) *Studies in Criticism*. [3-0]

487. (1½) *Studies in Drama*. [3-0]

488. (1½) *Studies in Poetry*. [3-0]

489. (1½) *Studies in the Novel*. [3-0]

490. (1½) *Introduction to Methods of Literary Research*.—Prerequisite: English 211. [3-0]

491. (3) *Third Year Honours Tutorial*. [3-0; 3-0]

492. (3) *Fourth Year Honours Seminar*. [3-0; 3-0]

496. (3) *Readings in English Literature*.

497. (3) *Readings in English Literature*.

499. (3) *Honours Essay*.

500. (1½) *Research Tools and Methods*.—Required of all graduate students lacking the equivalent.

501. (1½/3)**d** *Studies in Bibliography*.

502. (1½/3)**d** *Studies in Criticism*.

503. (1½/3)**d** *Studies in Prose*.

504. (1½/3)**d** *Studies in Drama*.

505. (1½/3)**d** *Studies in Fiction*.

506. (1½/3)**d** *Studies in Poetry*.

507. (1½/3)**d** *Studies in the History of the English Language*.

508. (1½/3)**d** *Studies in the Structure of the English Language*.

509. (1½/3)**d** *Studies in Rhetoric and Theory of Composition*.

510. (1½/3)**d** *Studies in Old English*.

511. (1½/3)**d** *Chaucer*.

512. (1½/3)**d** *Middle English Studies*.

515. (1½/3)**d** *Shakespeare*.

519. (1½/3)**d** *Studies in the Sixteenth Century*.

520. (1½/3)**d** *Studies in the Seventeenth Century*.

525. (1½/3)**d** *Studies in the Eighteenth Century*.

530. (1½/3)**d** *Studies in the Romantic Period.*
535. (1½/3)**d** *Studies in the Victorian Period.*
539. (1½/3)**d** *Studies in the Twentieth Century.*
540. (1½/3)**d** *Studies in American Literature to 1890.*
541. (1½/3)**d** *Studies in American Literature Since 1890.*
545. (1½/3)**d** *Studies in Canadian Literature.*
546. (1½/3)**d** *Studies in Commonwealth Literature.*
547. (1½/3)**c** *Directed Reading.*
549. (3) *Master's Thesis.*
552. (1½/3)**d** *Practical Criticism.*—Close reading and analysis of selected literary texts.
553. (1½/3)**d** *Text Analysis: Theory and Practice.*—An introduction to some of the theories which underlie modern methods of textual analysis.
649. *Ph.D. Thesis.*

English Education (Faculty of Education)

216. (1½) *Speech Communication.*—Articulation, projection, and vocal expression in instructional settings. [2-1; 0-0] or [0-0; 2-1]
304. (3) *Curriculum and Instruction in the Language Arts.*—A study of (a) the curriculum organization in the language arts, particularly in the intermediate grades; (b) techniques of instruction in these subjects and grades. [3-0; 3-0]
335. (3) *Drama in Education.*—A practical and theoretical study of educational drama involving improvisation, creative movement, role-playing and participatory drama. The application of drama to learning across the school curriculum. (Credit may not be obtained for both English Education 335 and Theatre 301.) [2-2; 2-2]
337. (1½) *Remedial Instruction in the Language Arts.*—Instructional principles, materials and methods for teaching students whose literacy achievement is at a low level. [3-0; 0-0] or [0-0; 3-0]
338. (1½) *Teaching Written Composition.*—Principles and practices in the teaching of written composition in all subject areas in elementary and secondary schools. [3-0; 0-0] or [0-0; 3-0]
340. (1½) *Using Canadian Literature in the Classroom.*—An examination of Canadian literature, both English and French (in translation), appropriate for use in Canadian schools, methods of using the cultural elements in Canadian literature in school programs. Pre- or co-requisite: 3 units from English 420, 421, 424, 426, 429 or French 414, 415, 416, 417. Credit will be given for only one of English Education 340 and Modern Languages Education 340. [3-0; 0-0] or [0-0; 3-0]
341. (3) *The Teaching of Children's Literature.*—The methodology of teaching literature to children. The appraisal of books and authors for children. The relationship of children's literature to other areas of the school curriculum. [3-0; 3-0]
349. (1½) *Teaching Literature for the Adolescent.*—Characteristics of literature written for and of special interest to adolescents, relevant research, and implications for instruction. [3-0; 0-0] or [0-0; 3-0]
379. (1½) *The Education of Immigrant Children.*—An examination of the cultural backgrounds of major ethnic groups. Instructional techniques for meeting the needs of immigrant children in the regular classroom with respect to culture and language. [3-0; 0-0] or [0-0; 3-0]
403. (3) *Curriculum and Instruction in Theatre (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in theatre, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]
404. (3) *Curriculum and Instruction in English (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in English, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]
416. (1½/3)**c** *Advanced Speech Communication.*—The principles, aims, and components of various types of oral communication such as conversation, group discussion, oral interpretation, choral speaking, story telling, and public speaking in instructional settings. Not all topics will be studied each term. [2-1; 0-0] or [0-0; 2-1]
435. (3) *Advanced Studies in Drama-in-Education.*—Recent advances in the uses of drama as a medium of learning and in the development of classroom programs. Laboratory experiences in role drama. Prerequisite: English Education 335. [2-2; 2-2]
478. (3) *Introduction to Teaching English as a Second Language.*—The application of linguistic insights to the effective teaching of English as a second language. Methods of teaching. Practice teaching. Prerequisite: one of English Education 489, English 329, Linguistics 100, 200, 420. May be co-requisite, with consent of the instructor. [3-2; 3-2]
480. (1½/3)**c** *Advanced Studies in Language Education.*—Topics will be selected from creative expression, poetry-writing, appreciation, reading, grammar, spelling, and other areas related to English Language Education. Credit will be given for only 3 units of English Education 480 and Modern Languages Education 480. [3-0; 0-0] or [0-0; 3-0] or [3-0; 3-0]
486. (1½) *Oral Language Development.*—Classroom activities for extending children's ability to express themselves orally. Diagnostic and remedial procedures for children with limited language competence. [3-0; 0-0]
489. (3) *Applied Linguistics for Teachers.*—Basic theories of linguistics and their application to classroom practice. [3-0; 3-0]
500. (3) *Research in Teaching of Children's Literature, K-12.*—Theory and research in teaching children's literature with application to elementary and secondary methodology and curriculum development. The place of children's literature in school curricula.
508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.
534. (3) *Theory and Research in Teaching Written Composition.*—Implications for teaching; the relationship of written composition to other aspects of the English program. For graduate students with experience in teaching English in elementary, secondary, or post-secondary institutions.
543. (3) *Theory and Research in Teaching English as a Second Language.*—Critical examination of theories and research in current educational practices in English as a second language/English as a foreign language. Implications for teaching in elementary, secondary and post-secondary institutions. Prerequisite: English Education 478 and a senior course in linguistics.
550. (3) *The Application of Theories of Second Language Acquisition to Curriculum and Instruction in Teaching Second Languages.*—Pedagogical implications of language acquisition theories such as sequential vs. simultaneous acquisition, the optimal age hypothesis, pidginization, and the identity hypothesis. Prerequisite: Linquistics 350 or equivalent course in Linguistics.
561. (1½-6)**c** *Laboratory Practicum.*
565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.
580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.
588. (1½/3)**d** *Seminar in Child Language in Education.*—Curricular and instructional applications of theory and research in child language studies. Prerequisite: Linguisitics 350 and senior course work in verbal learning or human development.
598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.
599. (3/6)**c** *Master's Thesis.*

Family and Nutritional Sciences (School of Family and Nutritional Sciences, Faculty of Arts)

See also courses under **Family Studies,** and **Human Nutrition**

100. (1½) *Introduction to Home Economics I.*—Home Economics as a distinct area of study integrating knowledge from the social, physical and biological sciences, and as professional preparation. Limited to students enrolled in the School of Family and Nutritional Sciences or in the Faculty of Education Home Economics major or concentration programs. [3-0; 0-0]
101. (1½) *Introduction to Home Economics II.*—For students intending to follow the Division of Family Science curriculum. Prerequisite: FNSC 100. [0-0; 3-0]
200. (1½) *Elements of Program Planning.*—Introduction to the concepts and techniques required to prepare information for audiences in a variety of settings that Home Economists may encounter. Open only to students in the School of Family and Nutritional Sciences. [3-0; 0-0]
201. (3) *Introductory Foods.*—Composition, structure and properties of foods. Effect of physical and chemical environment. Laboratory work applies scientific principles and theories to practical problems of food preparation. The approach is experimental in nature. Prerequisite or concurrent: Chemistry 230. [3-3; 3-3]
203. (1½) *Introductory Nutrition.*—Principles of nutrition. Emphasis on the dietary sources of nutrients, their physiological availability and metabolic utilization for the prevention of specific nutritional diseases and maintenance of health. Students cannot receive credit for both FNSC 203 and FNSC 305 and 307. Prerequisite: Chemistry 230. [3-0; 0-0]
205. (1½) *Community Nutrition and Public Health.*—Application of concepts of adequate diet for the improvement of health in all stages of human life. Emphasis on the evaluation and improvement of food habits and nutritional status; identification of problems connected with public health nutrition in Canada. Discussion of community nutrition programs and sources of reliable nutrition information. Prerequisite: FNSC 203 or 209. [0-0; 3-0]
209. (1½) *Nutrition.*—A basic course in nutrition emphasizing the function of nutrients in the body, the changes resulting from nutritional deficiencies, the distribution of nutrients in the diet, and the dietary requirements for various nutrients. Not accepted for credit toward the Bachelor of Home Economics degree. Prerequisite: Chemistry 11 or equivalent; Chemistry 12 or Chemistry 103 strongly recommended. [3-0; 0-0]
210. (3) *Human Growth and Development I.*—The process of human growth and development throughout the life cycle; the process of socialization from the point of view of the individual. [2-1; 2-1]
211. (1½) *Perspectives in Nutrition and Dietetics.*—Introduction to the study of nutrition and its application to dietetic problems in a modern society. Prerequisite: Second Year standing in the Division of Human Nutrition. [3-0; 0-0]
220. (3) *The Contemporary Family.*—Dating and courtship patterns. Marriage as a personal relationship. Contemporary families as they exist in an environment and as they create an environment. Emphasis on Canadian families. [3-0; 3-0]
240. (1½) *Family Resources.*—Application of theories of the family and of human development to the family's use of human and material resources. The effects of decisions concerning their use on the family and the community. Communication, decision-making and problem solving as continuing processes in the family. [3-0; 0-0]
301. (1½) *Contemporary Meal Management.*—Meal planning from purchasing to preparation, with emphasis on how food choices and patterns of consumption are influenced by economic, physiological, social and cultural factors. Prerequisite: FNSC 201 and one course in nutrition. Not available to students in the Dietetics program. [3-3; 0-0]
303. (1½) *World Problems in Nutrition.*—Ecological factors contributing to malnutrition problems as they exist today, particularly in underdeveloped areas. The laboratory will illustrate the assessment of nutritional problems in human populations. [0-0; 3-1]

305. (1½) *Human Nutrition I.*—Cellular and organismal features of nutrition, with an emphasis on energy metabolism and on the biochemical and physiological roles of carbohydrates, lipids and proteins in maintaining health and preventing diseases. Includes a laboratory. Credit cannot be obtained for both 203 and the combination of 305 and 307. Prerequisites: Biochemistry 300 and 301 and a course in physiology. [3-3; 0-0]

307. (1½) *Human Nutrition II.*—A continuation of course 305 to include discussions on the role of vitamins and minerals and their interrelationships in metabolism. Laboratory included. Prerequisite: FNSC 305. Credit will not be given for both FNSC 203 and the combination 305-307. [0-0; 3-3]

310. (1½) *Human Growth and Development II.*—The development of self, emphasizing creative personal behaviour and personal styles in human relationships. Prerequisite: FNSC 210. [3-0]

312. (1½) *Parent-Child Relationship.*—Parent-child interaction as affected by family structure and social conditions. Impact of social change on parent-child interaction. Prerequisite: FNSC 210 and 220. [3-0]

322. (1½) *Family Analysis.*—Theoretical approaches to the dynamics of the family throughout its existence: internal interaction; transactions with society. Strengths and vulnerabilities of families as a result of these interactions and transactions. Prerequisite: FNSC 220. [3-0]

340. (1½) *Problems in Family Finance.*—A study of major financial alternatives available to families during the various stages of the family life cycle. The course is concerned with material levels of living of families and with the possibilities for increasing the total welfare of families. Included in this course is a consideration of factors affecting use of income, patterns of spending family income, use of credit; providing security from economic hazards; provision of health care; approaches to the concept of social welfare. Prerequisite: FNSC 240 and ECON 100. [0-0; 3-0]

342. (1½) *Consumer Problems.*—A study of the role and function of the consumer in the market economy; the nature of the economic system and the place of the consumer in the economic cycle; forces back of consumer demand as custom-made wants, conspicuous consumption and emulation and producer-made wants as advertising; organizations and laws that affect the interest of consumers. Prerequisites: FNSC 240; Economics 100. [0-0; 3-0]

350. (1½) *Clothing and Human Behaviour.*—A study of human needs, cultural, and economic factors which influence clothing consumption and use. Application of sociological and psychological theories that give understanding to the clothing behaviour of an individual, as a unique being and as a member of a group. Prerequisite or concurrent: 6 units in Social Science. [0-0; 2-1]

351. (1½) *Human Physical Growth and Development.*—The course provides a review of the field of Human Biology from the aspects of physical development, covering pre-and postnatal growth and development and the concepts of maturation and aging. Emphasis will be placed on normal variations in these factors, and their consequence in the population. Not available to students in Family and Nutritional Sciences; not available for students for B.Sc. degree. Such students should refer to Paediatrics 351. [3-0; 0-0]

352. (1½) *Basic Textiles.*—A study of the historical and contemporary significance; physical, chemical, microscopic, and biological properties; fibre, yarn and fabric characteristics of the major natural and man-made non-thermoplastics and thermoplastics; problems in consumership. Prerequisite or concurrent: Chemistry 230. [3-0; 0-0]

354. (1½) *Comparative Clothing Construction.*—Investigation and application of clothing construction principles on traditional and newly developed fabrics. [2-3]

360. (1½) *Design Fundamentals.*—A study of the basic visual elements and the fundamental principles and concepts of design; purposes of design. [2-3]

364. (1½) *Housing For the Family.*—A study of the physical, social and economic aspects of housing. The course includes: housing as an economic asset; national housing needs and conditions; personal and social needs of families; housing and the family income; government's role in housing; community planning. Prerequisite or concurrent: Anthropology/Sociology 100 or consent of the instructor. [3-0; 0-0]

366. (1½) *Textile Design.*—Advanced study of design elements, principles and concepts with application to textile design. Prerequisite: FNSC 360. [1-3; 0-0]

400. (1½) *Contemporary Issues in Home Economics.*—Application of concepts from all areas of Home Economics to current problems and issues facing the profession. Fourth Year Family and Nutritional Sciences students only. Required of Family Sciences and General Home Economics majors. [0-0; 0-3]

401. (1½) *Advanced Foods.*—Evaluation of foods for nutrient content and characteristics of acceptability. Variations in food selection with ethnic background and periods of the life span. Prerequisite: Third or Fourth-year standing in Nutrition or Dietetics program or consent of instructor. [0-0; 2-3]

403. (1½) *Foods or Nutrition Seminar.*—Presentation and discussion of current developments in the area of foods and nutrition. Prerequisites: FNSC 201 and a course in nutrition. [0-0; 0-3]

404. (1½-4½)**d** *Family Sciences Seminar.*—Presentation and discussion of current developments in selected areas of Family and Nutritional Sciences. Open to 3rd- and 4th-year students with permission of instructor. [0-3]

407. (3) *Nutrition and Disease.*—The role of nutrition in the prevention, etiology and treatment of disease in the light of known disease processes. Emphasis on the role of the dietitian as a member of the health care team and on the application of therapeutic diets. Prerequisites: Fourth-year standing in Nutrition or Dietetics program or permission of instructor. [3-3; 3-3]

411. (1½) *Applied Human Nutrition.*—Nutritional requirements and dietary patterns of normal individuals throughout the life cycle. Prerequisites: FNSC 305 and 307 or consent of instructor. [3-0; 0-0]

414. (1½) *Aging and the Family.*—Aspects and issues of aging, with emphasis on family concerns. Role of the aged in various societies. Prerequisite: FNSC 210 or permission of instructor. [3-0]

420. (1½) *Elements of Housing Design.*—A study of housing design and the following influential factors: fundamental design principles, architectural design concepts, human physical and psychological needs, certain sociological factors, technology. Prerequisites: FNSC 360. [0-0; 2-2]

421. (3) *Institution Administration.*—Planning, organization and management of institution food services. Observation of food service operations in the community. Includes field trips, group projects, and experience in quantity food planning. Prerequisite: Fourth-year standing in Dietetics major. [3-2; 3-3]

422. (1½) *Family Research.*—Introduction to the types of research methods used in the study of the family, their special problems and applications. Techniques for both conducting and evaluating research. Prerequisites: FNSC 220 and STAT 203. [3-0]

430. (1½) *Designing Professional Communication Programs.*—Application of concepts of communication to designing programs for particular settings. Evaluation of such programs. [0-0; 3-0]

449. (3) *Honours Thesis.*

450. (1½) *History of Costume.*—A survey of the aesthetic, economic, cultural, social and political significance of costume in history from ancient Egypt to contemporary times. [3-0; 0-0]

452. (1½) *Advanced Textiles.*—A study of the comparative properties of textile fibres, yarns, and fabrics with emphasis on laboratory measurement of physical properties in addition to study of molecular structure and chemical behaviour at fibre level. Relationship and significance to consumership. Prerequisite: CHEM 230 and FNSC 352. [0-0; 3-2]

454. (1½) *Apparel Design I.*—Aesthetic theories and personal needs which influence the design of clothing. Such techniques as flat pattern and draping. Brief study of the fashion industry and prominent designers. Prerequisites: FNSC 354 and 360. [2-3; 0-0]

456. (1½) *Apparel Design II.*—Emphasis on such design techniques as draping and tailoring. Further study of the fashion industry and prominent designers. Prerequisites: FNSC 354, 360 and 454, or permission of instructor. [0-0; 2-3]

466. (1½-3)**c** *Special Problems.*—Presentation and discussion of current topics in a specific area of Family and Nutritional Sciences, based on original laboratory or field research.

476. (1½) *Directed Study in Family and Nutritional Sciences.*—Directed investigation of a problem, requiring a written or oral report of findings. Prerequisite: satisfactory standing and permission of faculty member supervising the investigation. Fourth year Family and Nutritional Sciences students only.

Family Practice (Faculty of Medicine)

401. (1½) *Introduction to Clinical Practice.*—A course of study for first year medical students which relates the basic medical and behavioural sciences to the clinical setting. Initial principles and skills of patient interviewing, history taking and physical examination are taught. Correlation clinics on medical and surgical problems illustrate patient-oriented examples of living human anatomy and physiology. Supervised patient contact is provided to the student in a variety of clinical environments: family physicians' offices, teaching hospitals and community agencies. Prerequisites: admission to the Faculty of Medicine or departmental permission.

426. *Rural Family Practice Experience.*—As apprentices of family physicians in rural communities students will participate in the professional and social/societal activities of doctors and their associates. Enrolment may be limited to posts available.

451. (1½) *Seminars in Family Medicine.*—An examination of the content of Family Medicine including practical sessions on selected clinical problems encountered in the office, home or institutions. 3rd year elective.

480. (1½) *Occurrence, diagnosis and management of athletic disabilities. Musculoskeletal and sense organs.*—Mechanisms underlying injuries to bones, joints, muscles and tendons during sport and recreational physical activity; infections and injuries involving skin, eyes, ears, nose and throat. Prerequisities: ANAT 390 or ANAT 400 or equivalent, plus PHYL 301 or ZOOL 303 or equivalent or admission to course at discretion of the Department of Family Practice. [4-0]

481. (1½) *Occurrence, diagnosis and management of athletic disabilities II. Internal Organs.*—Disorders of function of respiratory, cardiomuscular, hematological, gastrointestinal, genitourinary, endocrine and central nervous systems arising from sports and recreational physical activity. Effects of environment, heat, cold, pressure, (altitude and diving) and nutritional factors on athletic performance; mechanisms of adaptation to these external influences. Prerequisities: ANAT 390 or ANAT 400 or equivalent, plus PHYL 301 or ZOOL 303 or equivalent, or admission at the discretion of the Department of Family Practice. [4-0]

700. *Bedside Conferences.*—The bedside review of case histories and physical findings in cases with primary responsibility and those referred for specialist care. Discussion of pathophysiology and treatment at all levels of care throughout the normal lifespan is emphasized.

701. *Resident Seminars.*—The preparation and presentation of formal papers on specialized topics in Family Practice, by each member of the resident staff. The paper is criticized by a member of the clinical teaching team. One hour weekly.

702. *Office Practice.*—Technical procedures and patient care — three to twenty hours per week under supervision and instruction related to ambulatory, primary, patient care office diagnostic procedures and ongoing management.

703. *Family Practice Rounds.*—Lectures, seminars and reviews of clinical problems related to family practice. One hour weekly.

704. *Seminars on Patient Counselling.*—Personal and group interaction. One hour weekly.

705. *Medical Economics.*—A series of seminars, demonstrations and discussions on aspects of medical economics, office practice and personal security given by a number of experts in the various fields.

706. *Community Practice.*—An opportunity is offered for residents to experience the role and function of community helping agencies; as often as possible by following their own patient through the function of each specialized service.

Family Studies (School of Family and Nutritional Sciences, Faculty of Arts)

520. (3) *The Canadian Family in Historical and Cultural Perspective.*—An examination of theories of the family, the history and present status of families in Canada. Special attention will be paid to families both in the context of social, economic, and political change and in the context of theories of family development. [3-0; 3-0]

522. (3) *Research Seminar in Family Studies.*—An examination of the strategies and techniques used in the study of the family. Skills necessary for both conducting and interpreting research will be developed. Prerequisites: Statistics 203 or equivalent and a course in behavioural research methods, or permission of the instructor. [3-0; 3-0]

547. (1½-3)c *Directed Studies.*

549. (3/6)c *Thesis.*

Film (Faculty of Arts) — See Theatre

Fine Arts (Faculty of Arts)

Note: A lab fee will be payable at registration for studio courses. See Index for "Fees" and refer to "Special Fees."

100. (3) *Introduction to Art History.*—The forms, concepts, issues and language of analysis for the understanding of art in context, using examples of painting, sculpture, architecture, and other arts from the history of world art. [2-1; 2-1]

125. (3) *History of Western Art.*—The history of architecture, sculpture and painting of the Western World from Ancient Egypt and Mesopotamia to the present. Offered Extra-Sessionally only. Credit may not be received for both Fine Arts 125 and Fine Arts 225 and/or 226. [2-1; 2-1]

181. (3) *Basic Studio Practice.*—An introductory study of visual forms, conducted through weekly lectures and studio work. The course focuses mainly upon drawing and explores its relationship to other kinds of art practice. Enrolment restricted; priority to prospective Fine Arts major and B.F.A. students. [0-3; 0-3]

225. (1½) *Art in Western Europe, 800-1800.*—Painting, sculpture, and architecture from the age of Charlemagne, through the Middle Ages and the Renaissance, to the emergence of modern Europe. Credit may not be received for both Fine Arts 125 and Fine Arts 225 and/or 226. [2-1; 0-0]

226. (1½) *Modern Western Art.*—Changes in artistic tastes in painting, sculpture, and architecture after the French Revolution; major trends and their significance to the present. Credit may not be received for both Fine Arts 125 and Fine Arts 225 and/or 226. [0-0; 2-1]

251. (1½) *Aspects of Asian Art.*—A selective introduction to the arts of the civilizations of India, China, and Japan, with stress upon their diverse characteristics. [3-0]

261. (1½) *Native Arts of the Americas.*—General themes and trends in New World art. [3-0]

281. (1½) *Drawing.*—Basic skills in drawing, including life drawing. Required course for all B.F.A. students. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. Available both terms. [0-3; 0-0] or [0-0; 0-3]

282. (1½) *Painting.*—Some basic painting concerns. Priority given to students enrolled in the B.F.A Program. Prerequisites: Fine Arts 181 and three units of art history. [0-0; 0-3]

283. (1½) *Etching.*—Intaglio and relief printing especially metal-plate etching. Emphasis on the development of imagery in relationship to technique. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. [0-3; 0-0]

284. (1½) *Silkscreen.*—The use of hand-cut, photographic, and other silkscreen-printing techniques. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. [0-0; 0-3]

285. (1½) *Sculpture I.*—The use of malleable materials to explore ideas of sculptural volume, mass, and shape. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. [0-3; 0-0]

286. (1½) *Sculpture II.*—Composing with rigid or pre-formed materials. The application of machine technology to sculpture. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. [0-0; 0-3]

287. (1½) *Two-Dimensional Studies.*—Techniques for painting, printmaking, or other two-dimensional media. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. Not offered every year, emphasis varies with instructor. [0-3]

288. (1½) *Three-Dimensional Studies.*—Technical methods and the technology of sculpture and related three-dimensional art forms. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. Not offered every year; emphasis varies with instructor. [0-3]

289. (1½) *Photography.*—The practice and development of photography as an art form. Emphasis on aesthetic theory with regard to the photographic image. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. [3-0; 0-0]

290. (1½) *Lithography.*—The theory and practice of fine-art lithography with attention to the history of lithography in the fine arts. Priority given to students enrolled in the B.F.A. Program. Prerequisites: Fine Arts 181 and three units of art history. [0-0; 0-3]

327. (3) *Archaeology of the Ancient Near East.*—(Also listed as Religious Studies 300). [0-2; 0-2]

329. (3) *Greek and Roman Art.*—Emphasis on the architecture, sculpture, painting and decorative arts of Greece and Rome. (Also listed as Classical Studies 330). [3-0; 3-0]

331. (3) *Early Medieval Art.*—The transformation of Roman Imperial art into the medieval Christian arts of the Byzantine Empire and the Western European Kingdoms, A.D. 100-1000. Offered in alternate years. (Also listed as Religious Studies 326). [2-1; 2-1]

333. (3) *Architecture of the High Middle Ages.*—A study of the principle monasteries and cathedrals of Western Europe (ca. 1000-1300), with a view to understanding their technical, aesthetic, and theological dimensions as well as the role of contemporary institutions in their creation. Offered in alternate years. (Also listed as Religious Studies 327). [2-1; 2-1]

335. (3) *Art of the Italian Renaissance from Giotto to Michelangelo.*—A survey of the principle works of art from the rise of the city-states (ca.1250) to the phenomenon of Mannerism in the 16th century; topics include the new conception of the artist and the changing role of the patron as well as the transformation of traditional artistic genres. [2-1; 2-1]

337. (3) *Art of Western Europe,1600-1800.*—Manifestations in art of Catholicism as a European power; the absolutism of Louis XIV and Versailles; the bourgeoisie in Holland and Restoration England; and the urbanity and rationalism of 18th-century France, England, and Venice. [2-1; 2-1]

339. (3) *The Emergence of Modern Art.*—The relationships between art and social change from the French Revolution to 1900; discussion of styles and movements include neo-classicism, romanticism, impressionism, symbolism, and others. [2-1; 2-1]

340. (3) *Directions in Twentieth-Century Art.*—A survey of the arts of Europe and the United States since the turn of the century; an examination of major artistic movements, the achievements of seminal artists, and the modernist phenomenon will provide keys for the understanding of today's art. [2-1; 2-1]

343. (3) *Canadian Art.*—Painting and sculpture in Canada from colonial times to the present, including contemporary Indian and Inuit art, with emphasis on Canadian art of the 20th century. [2-1; 2-1]

347. (3) *Modernism in European Architecture.*—Architectural design in continental Europe and Great Britain from the Enlightenment to the present; major movements and architects with particular attention to the antecedents and formulation of Modernism. Offered in alternate years. [2-1; 2-1]

348. (3) *The Rise of North American Architecture.*—The emergence of a distinctive architecture from the early traditions of French Canada and the English colonies to the present; the growth of public and private patronage and contrasts between fashion and individual creativity. Offered in alternate years. [2-1; 2-1]

351. (3) *History of Early Chinese Art.*—Traditions of Chinese art from the earliest historic ages through the Han and Tang Dynasties (ca. A.D. 900), with stress on the importance of recent archaeological discoveries; the impact of Buddhism. Offered in alternate years. [2-1; 2-1]

352. (3) *History of Chinese Painting.*—Paintings and painters from ca. A.D. 800 to 1800, with stress upon both traditions and significant tranformations of style and approach. Offered in alternate years. [2-1; 2-1]

353. (3) *Buddhist Art of Japan.*—The development of Buddhist art traditions in the ancient capitals of Japan from the 6th to the 14th century, with reference to Buddhist art traditions in East Asia. Offered in alternate years. [2-1; 2-1]

354. (3) *Japanese Painting Traditions.*—Changing modes of artistic perception in the art of painting in Japan, with emphasis on narrative, landscape, and genre painting traditions from the 12th to the 19th century. Offered in alternate years. [2-1; 2-1]

355. (3) *Art of India and Southeast Asia.*—A survey of the art of India from ca. 2500 B.C. to the A.D. 16th century, and its extension to Sri Lanka, Afghanistan, Tibet, Nepal, and Southeast Asia. Offered in alternate years. [2-1; 2-1]

356. (3) *Buddhist Art of Asia.*—The mainstreams of Buddhist art—sculpture, painting, and architecture—from its origin in South Asia to its spread to Southeast and East Asia. Offered in alternate years. [2-1; 2-1]

359. (3) *Islamic Art and Archaeology.*—A study of the artifacts of Islam as an expression of Islamic beliefs. — (Also listed as Religious Studies 341). [0-2; 0-2]

361. (3) *Pre-colonial Art of South America.*—The art and architecture of the early cultures of South America, up to and including the Inca civilization of Peru. Offered in alternate years. [2-1; 2-1]

363. (3) *Arts of the Aztecs and their Predecessors.*—The historical development and symbolism of the architecture, monumental sculpture, mural painting, and funerary arts of the Aztecs and their predecessors including Olmec, Teotihuacan, and Toltec in ancient Mexico. Offered in alternate years. [2-1; 2-1]

365. (3) *Dynastic Arts of the Classic Maya.*—Mayan art and architecture in Mexico and Central America, with emphasis on the dynastic cult during the Classic Period (A.D. 200-900), recent discoveries and new interpretations, with discussions of Mayan astronomy and hieroglyphic writing. Offered in alternate years. [2-1; 2-1]

369. (3) *North American Indian Art.*—A survey of the art and architecture of the indigenous peoples of the United States and Canada from pre-historic times to the present. [2-1; 2-1]

373. (1½) *The Literature of Art (Bibliography).*—Introduction to library resources for primary and secondary research in art history. [2-1; 0-0]

375. (1½) *Approaches to Art History.*—Theories and problems in the study of art history. [0-0; 2-1]

380. (3) *Studio Theory.*—A seminar in problems in contemporary art practice and related theory. Required course for all B.F.A. students. Entry restricted to students enrolled in the B.F.A. program. [0-3; 0-3]

381. (3) *Intermediate Drawing.*—Drawing as a concentrated study. Analytical and perspective drawing. Entry restricted to students enrolled in the B.F.A. program. Prerequisite: Fine Arts 281. [0-3; 0-3]

382. (3) *Intermediate Painting.*—Development of personal style in painting technique. Entry restricted to students enrolled in the B.F.A. program. Prerequisites: Fine Arts 281 and 282. [0-3; 0-3]

383. (3) *Intermediate Printmaking.*—Fine-art printmaking techniques and imagery. Editioning, formal print quality, and exploration of multimedia printmaking. Entry restricted to students enrolled in the B.F.A. program. Prerequisites: Fine Arts 281 and one of 283, 284, or 290. [0-3; 0-3]

384. (3) *Intermediate Sculpture.*—Investigations of three-dimensional form through both plastic and structural means. Wood, metal, and other materials will be utilized. Entry restricted to students enrolled in the B.F.A. program. Prerequisites: Fine Arts 281 and one of 285 or 286. [0-3; 0-3]

385. (3) *Special Studies.*—Intermediate tutorial. Restricted to students enrolled in the B.F.A. program, by permission of and arrangement with the Department. Prerequisite: Fine Arts 281. [0-3; 0-3]

387. (3) *Studio Media: Painting and Drawing.*—Exploration of basic drawing and painting concerns. Intended primarily for B.A. major and honours students. Prerequisites: Fine Arts 181 and three units of art history. [0-3; 0-3]

388. (3) *Studio Media: Printmaking.*—Introduction to intaglio and relief printmaking with emphasis on metal-plate etching; other methods may also be considered. Intended primarily for B.A. major and honours students. Prerequisites: Fine Arts 181 and three units of art history. [0-3; 0-3]

389. (3) *Studio Media: Sculpture.*—Basic sculpture, including both plastic and structural approaches to form; assemblage technique; particular attention to the articulation of space. Intended primarily for B.A. major and honours students. Prerequisites: Fine Arts 181 and three units of art history. [0-3; 0-3]

393. (3) *History of the Film.*—(Also listed as Theatre 330) [2-2; 2-2]

397. (3) *Directed Study Abroad (Summer School).*

429. (1½/3)**d** *Studies in the Art and Archaeology of Greece and Rome.*— Prerequisite: Classical Studies 330 or permission of instructor. (Also listed as Classical Studies 429.)

Note: The complementary third-year course is a prerequisite for Fine Arts 431 through 469. Most of these seminars are normally offered in alternate years.

431. (3) *Seminar in Early Medieval Art.* [0-3; 0-3]
433. (3) *Seminar in Medieval Art.* [0-3; 0-3]
435. (3) *Seminar in 15th and 16th Century Art.* [0-3; 0-3]
437. (3) *Seminar in 17th and 18th Century Art.* [0-3; 0-3]
439. (3) *Seminar in 19th Century Art.* [0-3; 0-3]
440. (3) *Seminar in 20th Century Art.* [0-3; 0-3]
443. (3) *Seminar in Canadian Art.* [0-3; 0-3]
448. (3) *Seminar in North American Architecture.* [0-3; 0-3]
451. (3) *Seminar in Chinese Painting.* [0-3; 0-3]
453. (3) *Seminar in Japanese Art.* [0-3; 0-3]
455. (3) *Seminar in the Art of India and Southeast Asia.* [0-3; 0-3]
461. (3) *Seminar in the Art of South America.* [0-3; 0-3]
463. (3) *Seminar in Aztec Art.* [0-3; 0-3]
465. (3) *Seminar in Mayan Art.* [0-3; 0-3]
469. (3) *Seminar in North American Indian Art.* [0-3; 0-3]

480. (3) *Advanced Seminar.*—Required course for all B.F.A. students. Critiques to be arranged by the Department. Entry restricted to students enrolled in the B.F.A. program.

481. (4½) *Advanced Drawing.*—Entry restricted to students enrolled in the B.F.A. program. [0-6; 0-6]

482. (4½) *Advanced Painting.*—Entry restricted to students enrolled in the B.F.A. program. [0-6; 0-6]

483. (4½) *Advanced Printmaking.*—Entry restricted to students enrolled in the B.F.A. program. [0-6; 0-6]

484. (4½) *Advanced Sculpture.*—Entry restricted to students enrolled in the B.F.A. program. [0-6; 0-6]

485. (4½) *Advanced Special Studies.*—Entry restricted to students enrolled in the B.F.A. program. [0-6; 0-6]

486. (3) *Tutorial in Studio.*—Prerequisite: One of Fine Arts 387, 388, or 389. [0-3; 0-3]

497. (3) *Directed Study Abroad.*

499. (3) *Honours Essay.*

531. (1½/3)**d** *Studies in Early Medieval Art.*
533. (1½/3)**d** *Studies in Medieval Art.*
535. (1½/3)**d** *Studies in the Art of the Renaissance.*
537. (1½/3)**d** *Studies in 17th and 18th Century Art.*
539. (1½/3)**d** *Studies in 19th Century Art.*
540. (1½/3)**d** *Studies in 20th Century Art.*
543. (1½/3)**d** *Studies in Canadian Art.*
548. (1½/3)**d** *Studies in North American Architecture.*
551. (1½/3)**d** *Studies in Chinese Art.*
553. (1½/3)**d** *Studies in Japanese Art.*
556. (1½/3)**d** *Studies in Buddhist Art.*
561. (1½/3)**d** *Studies in the Indigenous Arts of the Americas.*

571. (3) *The Methodology of Art History.*
575. (3) *The History of Art History.*
577. (1½/3)**c** *Directed Readings.*

581. (6) *Studio V.*—Special course for students enrolled in the first year of the M.F.A. program.

582. (6) *Studio VI.*—Special course for students enrolled in the second year of the M.F.A. program.

599. (3) *Master's Thesis.*
649. *Ph.D. Thesis.*

Food Science (Faculty of Agricultural Sciences)

258. (1½) *Exploring Man's Food.*—Changing pattern of world food supply and needs; nature of man's food; issues on the safety, nutritive value and consumer acceptability of food; fabrication and processing of food. This course is intended primarily for non-Food Science majors. [0-0; 3-0]

259. (1½) *Introduction to Food Systems.*—A study of the characteristics of animal and plant tissues and fluids that are important to their transformation into food products. [0-0; 3-2]

301. (1½) *Food Chemistry.*—Constituents of food and their properties including carbohydrates, proteins, lipids, pigments, flavours and vitamins. Prerequisite: Chemistry 230. [2-2; 0-0]

302. (1½) *Analytical Methods.*—Principles and procedures for the analysis of food products. [0-0; 2-3]

303. (1½) *Quality Control, Standards and Evaluation.*—Laws and regulations governing food composition and grading; quality evaluation; organoleptic analysis; statistical quality control. Prerequisite: Plant Science 321. [0-0; 2-2-1]

308. (1½) *Principles of Food Process Science I.*—A study of preservation of tissue and fluid food systems by thermal processing, cooling and freezing with emphasis on product-process interactions. [3-2; 0-0]

309. (1½) *Principles of Food Process Science II.*—A study of preservation of tissue and fluid food systems by selected physical and chemical treatments with emphasis on product-process interactions. [0-0; 3-2]

401. (1½) *Food Process Science —Fabrication of Food Systems.*—Conversion of raw products to ingredients; formulation and manufacture of food systems. [2-2; 0-0]

402. (1½) *Food Process Science—Nutritive Aspects.*—Theory and practice of modification and evaluation of the nutritive properties of preserved and fabricated food systems. [0-0; 2-2]

410. (1½) *Chemistry of Food Systems.*—Physico-chemical aspects of sol-gel and liquid-solid transformations; chemistry of multi-phase food systems. [3-0; 0-0]

412. (1½) *Structural Bromatology.*—Structure and rheology of native, processed and fabricated food systems. Microtechniques. [2-2-1; 0-0-0]

414. (1½) *Applied Microbiology.*—Microbiological culture techniques for the production of materials of significance in Food Science. Prerequisite: Microbiology 200. [2-2; 0-0]

416. (1½) *Environmental Bromatology and Public Health Implications.*— Dynamic interaction between environmental components and food systems. Intrusion of microorganisms and toxic compounds into food systems. Sanitation methodology. Strategies in food safety inspection. Physical and chemical protection of food. [2-2-1; 0-0-0]

418. (1½) *Toxicants in Food Systems.*—Chemical, physical and biological properties of toxicants in food systems. Degradation of toxicants during food processing. [0-0; 3-0]

423. (1) *Undergraduate Seminar.*

430. (1-3)**c** *Directed Studies.*

499. (3) *Undergraduate Thesis.*—Design and execution of an experimental/analytical research project leading to preparation of a thesis. Consult with the Head of Department before the end of classes in third year.

500. (1-3)**c** *Graduate Seminar.*

501. (1) *Food Lipids.*—Chemical and physical properties of food lipids. Chemical alteration of food lipids during processing and storage: hydrogenation, crystal polymorphism, hydrolysis, thermal degradation and autoxidation. Offered in alternate years.

502. (1½) *Food Pigments and Colorimetry.*—Deterioration of food pigments and synthetic food colours during processing; colour perception and instrumental analysis. Offered in alternate years.

503. (1) *Chemistry of Food Proteins.*—Chemical and physical properties of food proteins. Offered in alternate years.

504. (1) *Molecular Basis of Chemoreception.*—Chemical and physical processes underlying the sensory properties of food. Offered in alternate years.

505. (1) *Food Suspensions, Emulsions and Foams.*—Physico-chemical concepts of food suspensions, emulsions and foams: surface-active agents, hydrophile-lipophile balance, emulsifiers, emulsion stability, foaming and antifoaming agents, foam stability, and rheology of these food systems. Offered in alternate years.

506. (1½) *Structure and Chemistry of Food Myosystems.*—Structural and chemical aspects of myosystems as related to fundamental properties and quality attributes of muscle as a food with emphasis on texture and flavour. Offered in alternate years.

507. (1) *Food Carbohydrates.*—Chemical, physical and structural aspects of simple sugars and polysaccharides such as starch granules, gums and pectins. Concepts of carbohydrate

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alterations during food processing and storage: nonenzymic browning reactions, starch granule gelatinization and retrogradation, depolymerization of polysaccharides, and polysaccharide-protein interactions in food. Offered in alternate years.

508. (1½) *Biorheology*.—Rheology of complex biological systems; biorheometry; rheological studies of selected biological tissues with emphasis on food systems. Offered in alternate years.

509. (1) *Food Enzymes*.—Chemical and physical properties of food enzymes; mechanisms of enzymic action; utilization of enzymes in food processing. Offered in alternate years.

513. (1½) *Advanced Food Fermentation*.—Current advances in food fermentation. Prerequisite: Food Science 414. Offered in alternate years.

516. (1) *Advanced Environmental Bromatology*.—Lectures and seminars dealing with mechanisms of biological intrusion into and degradation of food systems. Current theories on chemical, physical and biological control of microbial activity in food systems and on food contact surfaces. Current advances in detection of pathogenic and physiologically-injured microorganisms in food systems. Prerequisites: Microbiology 200, Food Science 416. Offered in alternate years.

530. (1-3)**c** *Directed Studies*.

549. (6) *Master's Thesis*.

649. *Ph.D. Thesis*.

Forest Harvesting (Department of Harvesting and Wood Science, Faculty of Forestry)

Forestry (Faculty of Forestry)—See also Forest Harvesting, Wood Science and Industry

260. (1½) *Forest Engineering Economics*.— Detailed methods of planning and analysis of economic problems encountered in harvesting operations. Corequisite: Economics 100. [0-0; 3-1]

262. (1½) *Principles of Timber Harvesting Systems*.—Introduction to systems and analyses used in timber harvesting. Relationships with forest land management practices and the forest environment will be emphasized. Intended for harvesting students only. Prerequisite: Forest Harvesting 263. [3-2; 0-0]

263. (1½) *Basic Forest Surveying*.—An introduction to the basic techniques of surveying with special emphasis on the problems encountered in a forest environment. The course will be held on the UBC campus for 10 days immediately prior to the commencement of second year.

352. (1) *Harvesting Field Trip*.—A 5-day field trip immediately prior to the fall term of third year to demonstrate current harvesting practices and their implications on silviculture, management, protection and utilization in representative forest types. A substantial written report is required as part of the course. Fees will be assessed to meet expenses. (See Index—Fees "Special Fees".)

359. (1½) *Cable Mechanics*.—Engineering aspects of cable logging systems. Calculation of tensions, load carrying capability and load paths of common cable systems. Analysis of guyline tensions and anchor loads. Application of desktop computers to cable system design and layout. Prerequiste: Physics 170, Mathematics 200. Corequisite: Civil Engineering 230. [0-0; 2-2]

362. (1½) *Timber Harvesting*.—Methods of planning, analysis and supervision of timber harvesting operations. Prerequisites: Forest Harvesting 262 or 364, and Forest Harvesting 260. [0-0; 2-2]

363. (1½) *Forest Roads Surveying and Design*.—Methods in forest route surveying with emphasis on forest road location and design. Prerequisite: Forest Harvesting 263. [3-2; 0-0]

364. (1½) *Timber Harvesting Systems*.—Introduction to the methods used in timber harvesting and their relationship to forest land management practices and the forest environment. Prerequisite Forest Harvesting 263. (Not available to harvesting students.) [3-2; 0-0]

459. (1½) *Analysis of Harvesting Operations*.—Industrial engineering aspects of the planning and control of harvesting operations. Desktop computer applications of digital terrain models, setting analysis, road design and appraisal, equipment repair and maintenance record keeping and analysis, production record keeping and analysis. Prerequisite: Forest Harvesting 359 and 362. [2-2; 0-0]

463. (1½) *Forest Roads and Bridges*.—Design and construction of forest roads and their drainage structures, mainly culverts and bridges. Prerequisites: Physics 170, 175; Applied Science 270 and Wood Science 373. [0-0; 2-2]

464. (1½) *Forest Transportation Systems*.—Technical, economic and environmental aspects of materials handling processes for forest products excluding skidding and yarding. Prerequisite: Forest Harvesting 262 or 364. [0-0; 2-2]

465. (1½) *Mechanization of Forest Operations*.—Elements and operation of internal combustion engines. Principles of traction, tracks, wheels and tires. Road performance, braking, steering. Auxiliary equipment on trucks and machines, hydraulic accessories. Stationary machines, multiple winches and interlocks. Off-road vehicles and their operation. Terrain vehicle interactions. Machine management, maintenance principles. Prerequisite: Physics 170, 175; Forest Harvesting 262 or 364. [2-2; 0-0]

Forestry (Faculty of Forestry) —
See also courses under Forest Harvesting and Wood Science and Industry

111. (3) *Dendrology*.—Development, anatomy, morphology, function and autecology of trees. Prerequisite: Biology 12 or Biology 101 or 102 (corequisite). [3-2; 3-2]

130. (3) *Biometrics and Data Processing*.—Basic theories of probability and statistics; applications to forestry; FORTRAN IV computer programming; programming techniques for statistical and numerical analysis in forestry. Prerequisite: Math 100, 101 (pre or corequisite). [3-2; 3-2]

202. (1½) *Forest Ecology*.—Form and functioning of forest ecosystems. Interaction of organisms with their physical and biotic environment. Introduction to the biogeoclimatic classification of B.C., and some coastal forest ecosystems. The material covered in the course constitutes the ecological basis for silviculture and forest management. Corequisite: Forestry 111, Geography 214, Soil Science 200. [3-2; 0-0]

203. (1½) *Silvics of Forest Trees of Western Canada*.—The autecology of the major tree species of British Columbia and other western provinces will be covered, together with their silvicultural characteristics. Prerequisite: Forestry 202 or 205. [0-0; 3-2]

205. (1½) *Forest Ecology for Forest Harvesting*.—Introduction to the structure and functional processes of forest ecosystems. Review of the autecology (silvics) of the major commercial tree species of B.C. Introduction to biogeoclimatic classification and evaluation of the environmental impacts of forest harvesting. Prerequisite FRST 111; corequisite Soil Science 200 [0-0; 3-2]

237. (1½) *Introduction to Forest Mensuration and Photogrammetry*.—Measuring and estimating tree volumes, form and taper. Timber scaling and grading. Computer applications. Basic photogrammetry, mapping for photography and photo-based inventory systems. Prerequisite: Forestry 130. [3-2; 0-0]

238. (1½) *Forest Mensuration*.—Forest inventory methods. Growth and yield prediction. Applications of multiple linear regressions and sampling techniques. Regeneration and residue surveys. Introduction to multiple resource inventories. Prerequisite: Forestry 237. [0-0; 3-2]

252. (1-3)**d** *Field Study Tour*.—Directed field experience for first or second year students in one of the major forest-producing regions of the world. A post-tour report is required.

290. (1½) *Principles of Forest & Wildland Recreation*.—An introduction to the foundations of outdoor recreation and associated tourism in modern society, to the recreational use of parks, forests and associated wildlands, and to the evaluation and analysis of forest management impacts on recreation, landscape aesthetics, and associated values. [2-2; 0-0]

292. (1½) *Forest Recreation Site Planning and Design*—Study and evaluation of the biophysical, technical, activity requirements, and design aspects of forest and wildland outdoor recreation places, of associated tourism development projects, and of their use; emphasis on the fundamentals of park, forest-park, forest recreation area and resort development planning. Site investigations. [3-0; 0-0]

300. (3) *Principles of Forestry and Wood Sciences*.—Objectives, introduction to methods; scientific and economic bases; examples of forest land use, multiple purpose forestry, and forest products manufacture and use. Some field trips available and highly recommended. (Not available for credit to undergraduate forestry students; no prerequisites.) [3-0; 3-0]

302. (1½) *Forest Genetics*.—Principles of genetics and their application to forestry; selection and breeding methods. [0-0; 2-2]

303. (1½) *Silviculture for Harvesters*.—Principles and practices of silviculture. Scope of silviculture and its relation to forestry and economics. Methods of natural and artificial regeneration. Treatment of forest stands to improve growth, structure, species composition and quality. Intensive applications of silvicultural methods for wood production. Silvicultural applications for non-timber purposes. Prerequiste: Forestry 202 or 205. [3-2; 0-0]

305. (1½) *Silviculture I*.—Silviculture concepts, and principles; establishment of stands, principles of forest tree improvement; seed handling, nursery practices and artificial regeneration. Prerequisite: Forestry 202, 203. [3-4*; 0-0]

306. (1½) *Silviculture II*.— Natural regeneration, requirements stand tending practices: thinning, pruning, herbicide use and fertilization. Site preparation; silvicultural systems; silviculture guides and development of prescriptions; elements of decision making, monitoring and control systems. Prerequisite: Forestry 202, 203, 305. [0-0; 3-4*]

308. (1) *Forest Entomology*.—An introduction to insects which cause damage to forests and forest products; how insects live; life cycles and attack symptoms of representatives of major groups of insects; principles for control and management. [2-2; 0-0]

309. (1) *Forest Pathology*.—Biology and management of forest tree diseases. Prerequisite: Forestry 202 or 205. [0-0; 2-4*]

312. (1½) *Forest Soils*.—Forest soil properties, processes, and fertility; forest soils in relation to resource management. (Also offered as Soil Science 303.) Prerequisite: Soil Science 200 or 205. [0-0; 3-2]

319. (1½) *Principles of Forestry Economics*.—Introduction to the economics of production, distribution and consumption of goods and services produced by, and dependent on, the forest resource. Prerequisite: Economics 100. [3-1; 0-0]

325. (1½) *Timber Management*.—Objectives and methods of planning for timber production and multiple purpose forestry. Prerequisites: Forestry 238, 303 or 305, 319. [0-0; 3-2]

327. (1) *Forest Fire Science and Management*.—Ecological effects of fire; fire behaviour; fire danger rating; principles of fire management and prescribed fire use. Prerequisite: Soil Science 200, Forestry 202 or 205. [2-4*; 0-0]

331. (3) *Optimization Techniques in Forestry*.—Theory and application of probability, simulation, network techniques, linear and dynamic programming, and queuing analysis. Prerequisites: Mathematics 101 and Forestry 130. [2-2; 2-2]

348. (1) *Forestry Technical Essay*.—Students entering Third Year are required to submit an essay of not less than 2,000 words. It shall be a technical description of the work on which the student was engaged during the summer, or of any scientific or professional work with which the student is familiar. An essay outline must be submitted to the Dean by September 17. The final copy is due November 1. Detailed instructions are available from the Forestry office.

351. (1½) *Interior Field School*.—Fourteen days of field study at a southern interior B.C. location immediately prior to the commencement of third year. This course, which is

required of all forestry students in the Forest Resources Management and Forest Biology Major programs before they enter the third year of the program, will focus on land use, management and silviculture in the study area. Fees will be assessed to meet the expenses. (See Index—Fees "Special Fees".)

385. (1) *Forest Hydrology and Watershed Management.*—The application of the principles of forest hydrology to the management of forests for water and watershed protection. Prerequisite: Geography 214; Corequisite Soil Science 200. [0-0; 2-2]

386. (1) *Forestry-Fishery Interactions.*—Ecology of commercially and recreationally important fishes in forested watersheds in relation to forest harvesting impacts. [0-0; 2-2]

392. (1½) *Recreation and Resources Planning.*—Lectures and demonstrations outlining concepts and component elements of regional recreation planning, in theory and in practice: recreation demand analysis, supply analysis, methods of resource and visitor inventory and evaluation of resource potentials for outdoor recreation; survey of methods of acquisition and of development: park and forest recreation management planning, outdoor recreation systems planning at national, provincial and regional levels of government. [0-0; 2-2]

395. (1½) *Forest Wildlife Ecology and Management.*—Biology of important bird and mammal species resident in forested regions, with particular emphasis on the influences of silvicultural and logging practices. [3-2; 0-0]

399. (1) *Research Methods.*—Lectures and seminars in research philosophies and the scientific method, with special emphasis on field research. [1-1; 1-1]

403. (1½) *Ecology of Forestry.*—The functional and dynamic characteristics of forest ecosystems and their response to forest management. The course will cover the following topics: energy flow, biomass, nutrient cycling, ecological succession, and the effects of forest management practices thereon. Prerequisites: Forestry 202 and 203. [0-0; 3-2]

404. (2) *Advances in Silviculture.*—Fundamental silvicultural problems; the application of research findings to the practice of silviculture. Prerequisite: Forestry 305, 306. [2-0; 2-0]

405. (1½) *Forest Ecosystems.*—Ecosystem classification of B.C. forest land. The biogeoclimatic classification of B.C. as a basis for forest land management. [2-2; 0-0]

406. (1½) *Methods in Forest Pathology.*—Field and laboratory methods and techniques in handling disease problems in trees, stands, and forest products. Prerequisite: Forestry 309. [2-2; 0-0]

408. (1½) *Problems of Forest Entomology.*—Decision-making in the protection of forests from insects. Insect problems viewed from other disciplines of forestry. Bases of biological and economic evaluation, and choice of control methods. [0-0; 2-2]

411. (1½) *Tree Physiology.*—The physiology of growth, development and responses of woody plants with particular consideration of the influences of environment and genetic factors on physiological responses; the consequences of silvicultural practices on physiological processes. Prerequisites: Forestry 111 and Botany 330 or approval of instructor. [0-0; 3-2]

415. (1) *Forest Policy.*—The development, implementation and analysis of forest policy. Prerequisite: Forestry 303 or 306; 319 or 360; Corequisite: Forestry 325. [0-0; 2-1]

419. (1½) *Forestry Economics.*—The application of economic theory to the management of forest lands and forest-based industries. Prerequisite: Economics 100. [0-0; 3-0]

420. (1½) *Forest Environmental Management.*—Forestry impacts upon environment; man's relationship to the forest; interactions of industrial forest practice with other resource uses, their economic implications and relevance; approaches to and problems of maintaining environmental quality. [2-2; 0-0]

421. (1½) *Case Studies in Integrated Resources Management.*—Decision-making in the management of resources associated with and arising from forests. A major emphasis on student involvement through case studies and managerial role-playing. [0-0; 2-4]

422. (1½) *Land Classification.*—Methods of data collection, analysis and classification of land for multiple uses. (This course is the same as Soil Science 417.) Prerequisite: Forestry 442. [0-0; 2-2]

425. (1½) *Advanced Timber Management.*—Preparation and analysis of plans for regulating and increasing timber production; methods, regional forestry examples and case studies. Prerequisite: Forestry 325. [3-2; 0-0]

427. (1½) *Advances in Forest Fire Science and Management.*—Fire in ecosystems; forest fire management policies; advanced fire management and use of prescribed fire; the application of research findings to fire management. Prerequisite: Forestry 327. [0-0; 2-2]

430. (1½) *Advanced Biometrics.*—Analysis of variance, multiple regression and analysis of covariance. Design and analysis of experiments. Prerequisite: Forestry 130. [3-2; 0-0]

431. (1½) *Sampling Methods.*—Theory and design of sampling techniques with emphasis on application to natural resources. Prerequisite: Forestry 238. [0-0; 3-1]

432. (1½) *Forest Resource Supply and Allocation Models.*—Uses of stand and forest models to investigate and illustrate timber supply allocation and regulation problems; applications of simulation, and linear and goal programming to forest resources management. Prerequisite: Forestry 130, 319. [3-2; 0-0]

435. (1½) *Computer-based Image Analysis for Forest Inventory Systems.*—The digital processing of remotely sensed image data for forest inventory. Techniques for acquiring, calibrating, registering, enhancing and interpreting digital satellite data. Digitized planimetric and topographic map data bases. Case studies of existing forest inventory systems. Prerequisite: Forestry 237. (Same as Computer Science 435) [0-0; 2-2]

436. (1½) *Growth and Yield.*—Techniques of measuring and estimating growth and yield of trees and stands. Prerequisite: Forestry 238. [0-0; 2-2]

439. (1½) *International Forestry.*—The socio-economic, biological and technological aspects of forestry within the international frame, in both the developed and developing world. Regional studies and the role of national and international agencies. (Non-forestry students must have instructor's permission). [2-2; 0-0]

442. (1½) *Photo-Interpretation of Forest Lands.*—Landform identification and terrain analysis from air photographs, application to forest and agricultural land mapping. This course is the same as Soil Science 442. [2-2; 0-0]

443. (1½) *Remote Sensing in Forestry and Agriculture.*—Basic biological concepts related to interpretation of remote sensing data for land management, including the use of films and filters, and interpretation of air photographs, and other imagery. This course is the same as Soil Science 443. [2-2; 0-0]

445. (½) *Seminar.*—Oral presentation and discussion of current forestry topics; reviews of important papers in forest periodicals. [0-1; 0-1]

449. (1-3)c *Directed Studies in Forestry.*—In special cases and with the approval of the instructor concerned a student may carry on directed studies of specific problems in forestry.

451. (3) *Field Work in Harvesting, Silviculture and Mensuration.*—Twenty-one field days of study at the University Research Forest are required of all forestry students preceding their final year at the University. Fee will be assessed to meet the expenses. (See Index—Fees "Special Fees".) Individuals with extraordinary experience may apply to the Dean for exemption from the whole or part of Forestry 451.

452. (1-3)c *Regional Field Studies in Forestry and Forest Products.*—Directed field experience in one of the major forest-producing regions of the world. Pre-tour seminars and post-tour reports are required.

462. (1½) *Industrial Forest Management.*—The relationships, interactions, functions, and objectives of the companies, governments, unions, and associations which make up the forest industry. [2-2; 0-0]

485. (1) *Forest Watershed Management.*—Effects of land management on quality, quantity and timing of water flow. Prerequisite: Forestry 385. [2-2; 0-0]

486. (1½) *Forestry, Water Quality, and Fish.*—Physical, chemical, and biological quality of aquatic ecosystems and the impacts of forest industry and forest management practices on water quality and fish. Prerequisites: Forestry 385, 386. [2-3; 0-0]

490. (1½) *Visual Resource Management.*—Study of the theory, practice and history of visual resource management. Covers methodologies for analysis, design and management of the visual guidelines; operational policies of resource extraction industries; and the implication on multiple land use management. Specific case studies are examined and problems in visual resource management are undertaken by the student. (Same as Landscape Architecture 340.) [0-0; 2-2]

491. (1½) *Forest and Wildland Recreation Management.*—Advanced study of the principles, problems and practices in managing resources and visitors for recreation opportunities in forests, wildlands and non-urban parks; analysis of natural heritage conservation policies; the application of research findings to natural heritage conservation and recreation land management. Prerequisite: Forestry 290 [2-2; 0-0]

495. (1½) *Forest Wildlife Management.*—Theory and techniques of evaluation and manipulation of wildlife populations and habitat. Approaches to decision-making in multiple resource systems with particular emphasis on forested lands. Prerequisite: Forestry 395. [0-0; 2-2]

497. (1) *Graduating Essay or Technical Report.*—An essay or technical report of not less than 4,000 words. The subject must be selected from students' area of concentration. The report can be a technical description of a scientific or professional study or a detailed literature review of a given subject area. Prerequisite: Forestry 348.

498. (3) *B.Sc. Thesis in Forestry.*—An independent study or research project of a subject of special interest to the student under the direction of a staff member. The subject must be appropriate to the student's area of concentration. Prerequisite: Forestry 348.

499. (3) *B.S.F. Thesis.*—An independent study or research project of a subject of special interest to the student under the direction of a staff member. The subject may be scientific or technical but must be appropriate to the student's area of concentration. Prerequisite: Forestry 348.

500. (1-3)c *Studies in Forest Tree Physiology.*—Principles of plant physiology as applied to problems in growth and development of tree species.

502. (1-3)c *Studies in Forest Genetics.*—Problems associated with forest tree improvement; analysis of variation in tree quality.

504. (1-3)c *Silvics and Silviculture.*—Directed study in silvical characteristics of forest trees; silvicultural systems.

505. (1-3)c *Advanced Studies in Forest Ecosystems.*—Directed studies in the energetics and biogeochemistry of forest ecosystems including studies on the ecological impact of forest land management practices.

506. (3) *Advanced Forest Pathology.*—Studies of hereditary, physiological, anatomical, and microbiological factors of trees and pathogens that influence levels of resistance or susceptibility to disease. (Given in alternate years.)

507. (1-3)c *Problems in Forest Protection.*

508. (1½) *Forest Insect Ecology.*—Interactions between insects and forests; evaluation of current approaches to research in forest entomology; examination of theories and axioms; application of ecological principles in pest management.

510. (1) *Forest Tree Seed.*—Seed production, collection, provenance, testing, treatment, and the application of these to the practice of forestry.

512. (1-3)c *Problems in Forest Soils and Tree Nutrition.*—Directed studies of forest soils and tree nutrition (see also Soil Science 503).

514. (1) *Seminar in Forest Biology.*—Advanced topics in biology as related to forestry and wood sciences.

515. (1-3)c *Studies in Forest and Land Use History.*

517. (1-3)c *Studies in Forest Policy.*

519. (1-3)c *Advanced Studies in Forest Economics and Finance.*—Economics of reforestation, forest land management, harvesting, manufacturing and marketing.

521. (1-3)c *Studies in Forest Development Planning.*—Silvicultural, managerial, and manufacturing methodology for development with particular regard to the developing nations.

523. (1-3)c *Advanced Studies in Forest Management.*—Problems in forest and forest land management; planning and development of forestry or forest industry programs.

525. (1-3)c *Problems in Forest Land Management.*

527. (1-3)c *Studies in Forest Fire Science and Management.*—Directed studies in forest fire science and management.

529. (1) *Seminar in Management of Forest Resources.*—Objectives and methods for integration and improvement of management and use of forests and associated wildlands.

530. (1½) *Multiple Regression Methods.*—Matrix algebra; algebra and inference of multiple linear and multiple curvilinear regressions for solution of problems in forestry and related fields. Non-linear regression. Methods of least squares for analysis of variance and covariance. Given in alternate years.

531. (1½) *Multivariate Statistical Methods.*—Multivariate analysis of variance cluster, principal components, factor, canonical and discriminant analysis. Theory and conceptual background are presented but emphasis is on selection of appropriate analysis and interpretation of results. Examples from forestry and related fields are analysed by computer programs available at UBC. Given in alternate years.

532. (1-3)c *Data Processing in Forestry.*—Selected readings and problems in the collection and analysis of data in forestry. Use of electronic computers for special forestry and forest research problems. Prerequisite: A good working knowledge of a programming language, preferably FORTRAN.

533. (1-3)c *Problems in Statistical Methods.*—Directed studies in problems of advanced statistical techniques as a tool in forest research.

536. (1-3)c *Advanced Studies in Forest Mensuration.*—Development and analysis of forest inventory systems; sequence and patterns of tree growth; analysis of crown development; improvement of stand growth and yield; methods of bio-mass analysis.

539. (1-3)c *Problems in Forest Sampling.*

542. (1-3)c *Advanced Studies in Forest Photogrammetry.*—Problems in photointerpretation, photo-mensuration and forest-land classification.

543. (1) *Selected Topics in Remote Sensing.*—A weekly two-hour seminar series in applied aspects of remote sensing pertaining to natural resources topics; included are uses of remote sensing in forest appraisal, forest recreation, wildlife and soils.

545. (1) *General Forestry Seminar.*—Selected topics in Forestry and Wood Sciences. (Note: Either Forestry 545 or 584 will be required for the first year of all graduate students in Forestry. One or more of Forestry 514, 529, 546 and 584 to be taken concurrently, or subsequently.)

546. (1) *Seminar in Research Methods.*—Needs, philosophy, objectives, and criteria for initiation and evaluation of projects, programs and missions.

547. (1) *Seminar in Forest Harvesting.*—Selected topics in forestry and harvesting.

549. (3/6/9)c *Master's Thesis.*

555. *(3) Dynamic Programming in Resource Allocation.*—Mathematical background, classical optimization methods, principle of optimality in one, two, and three dimensions; dimensionality reduction; feedback mechanisms; examples from Forestry and Natural Sciences. Prerequisites: linear algebra, calculus, probability theory, or consent of instructor.

559. (1-3)c *Operations Research in Forestry.*—Directed studies in the application of O.R. techniques to the diverse problems of the forest environment and forest industries.

562. (1-3)c *Microcomputer Applications in Forest Engineering.*—Directed studies in analyzing micro computer applications related to the planning, analysis and design of harvesting operations.

563. (1-3)c *Problems in Forest Engineering.*—Planning and control of logging systems; special design problems of forest roads, bridges, cableways and associated structures.

567. (1) *Logging Cableways.*—Location, design and construction of cableways.

570. (1-3)c *Wood Science.*—Research in basic wood and fibre properties; anatomy, chemistry and physics; analysis of variation in wood qualities; chemistry of wood extractives.

572. (1-3)c *Energy Transfer Mechanisms in Wood and Related Products.*—Response of high polymers to energy sources with special reference to chemical and physical effects on wood and related products; cross-linking, copolymerization and degradation reactions; ionizing radiation.

574. (1-3)c *Rheological Behaviours of Wood Base Materials.*—Time-dependent phenomena of the wood matrix and wood fibre webs; relation of polymer constructions with emphasis on wood molecular architecture; features of viscoelastic memory systems. Corequisites: Wood Science 375 and Mathematics 300.

576. (1-3)c *Origin of Wood Pulp Properties.*—Exploration of basic interrelationships between wood characteristics, chemical and mechanical processing and wood pulp behaviours. Corequisites: Wood Science 375, 377, 473.

578. (1-3)c *Advanced Studies in Wood Products.*—Research in the properties of solid and reconstituted wood products.

580. (1-3)c *Problems in Forest Products.*—Directed study in problems associated with the forest industries; utilization; integration; development and marketing of forest products.

584. (1) *Wood and Pulp Science Seminar.*—Presentation and critical review of topics and problems relating to wood properties and manufacturing processes. Credit granted for each year of participation up to a maximum of two units.

585. (2) *Research Methods in Forest Hydrology.*—Methodology and technique of studying the terrestrial components of the hydrologic cycle, in relation to forest hydrology.

587. (1-3)c *Research in Forest Hydrology.*

589. (1-3)c *Problems in Forest Watershed Management.*

591. (1-3)c *Research Methods in Forest and Wildland Recreation.*

593. (1-3)c *Problems in Forest and Wildland Recreation.*—Analysis of and solutions to problems in administration and management of recreation resources in forests, wildlands and non-urban parks.

595. (1-3)c *Research Methods in Forest Wildlife Studies.*

597. (1-3)c *Problems in Forest Wildlife Management.*

599. (3/6/9)c *M.A.Sc. Thesis.*

649. *Ph.D. Thesis.*

French (Faculty of Arts)

100. (6) *Beginning French—Intensive Course.*—Grammar, composition, reading and oral practice. Not available to students with prerequisite for French 110. [5-2; 5-2]

105. (3) *Beginning French.*—Grammar, composition, reading and oral practice. Not available to students with prerequisite for French 110. [3-1; 3-1]

110. (3) *First-Year French.*—Prerequisite: French 11 or French 105. Not available for credit to students with French 12 or French 100. [3-1; 3-1]

115. (3) *First-Year French Practice.*—A conversational approach to French culture. Prerequisite: French 12 or permission of the Department. [5-1; 5-1]

120. (3) *Contemporary French: Language and Literature.*—Prerequisite: French 12, French 100 or French 110. (May be taken for credit in 2nd Year.) [3-1; 3-1]

202. (3) *Studies in French Language and Style, I.*—Composition, oral practice, translation. To be taken by all students intending to proceed to the Major or Honours program. Prerequisite: French 120 or equivalent. [3-1; 3-1]

215. (3) *Second-Year French Practice.*—A continuation of French 115. Prerequisite: French 115 or permission of the Department. [4-1; 4-1]

220. (3) *An Introduction to French Literature.*—To be taken by all students intending to proceed to the Major or Honours program. Prerequisite: French 120 or equivalent. [3-0; 3-0]

301. (3) *Third-Year Seminar.*—Introduction to techniques of literary analysis. A limited number of texts will be examined closely. Required course for Honours students specializing in literature. Highly recommended for third-year Honours students specializing in language, and open to Major students with a good second-class standing and permission of the Department. [2-0; 2-0]

302. (3) *Studies in French Language and Style, II.*—Composition, syntax, versification, advanced translation and oral practice. Prerequisite: French 202. [3-1; 3-1]

303. (3) *French Practice for Non-Specialists.*—French grammar, oral expression, reading skills and short, written compositions. Not available for credit towards a Major in the Department of French. Prerequisite: French 120 and at least third-year standing. Credit will not be granted for both French 202 and 303. [3-1; 3-1]

304. (3) *Commercial French.*—The essential vocabulary and style of French commercial correspondence and business texts. Not available for credit towards a major or honours degree in French. Prerequisite: French 202 or 303 or permission of the Department. [3-0; 3-0]

305. (3) *Techniques of Oral Expression in French.*—Intensive workshop designed to strengthen skills in formal oral presentation in French, emphasis on structured expression as well as effective oral delivery. Prerequisite: second-year French course (second-class standing or better recommended in French 215) or permission of Department. Not available for credit towards a Major or Honours degree in French. [4-1; 4-1]

306. (3) *French Phonetics.*—Theory and practice of French pronunciation, corrective phonetics; phonemics, intonation, and training in reading aloud. Prerequisite: French 202 or 220. [2-2; 2-2]

308. (3) *Introduction to the History of the French Language.*—The development of the language from Vulgar Latin to the present. Prerequisite; one year of Latin. [3-0; 3-0]

316. (3) *French Applied Linguistics.*—The morphology and syntax of French as contrasted with English. Prerequisite: French 202. [3-1; 3-1]

320. (3) *French for Reading Knowledge.*—This course provides students having no previous language instruction in French with a basic knowledge of French grammar and vocabulary sufficient for the understanding of scientific and scholarly works. Classwork and outside assignments consist mainly of oral and written translation into English of texts from the humanities, the social sciences and the natural sciences. Intended primarily as a service course for university departments requiring a reading examination in their advanced programs, this course is not accepted for credit toward a French Major and does not satisfy the language requirement of the Faculty of Arts. [3-0; 3-0]

323. (3) *French Practice for Elementary Teachers.*—Designed to improve the oral and written proficiency of teachers in the French exposure programs at the elementary level. This course assumes a general background knowledge of French grammar. Not accepted for credit toward a Major or Honours degree in the Department of French. Prerequisite: permission of the instructor (based on interview and/or placement test). [3-1; 3-1]

334. (3) *French Civilization.*—A thematic approach to French literary works considered in a broad cultural context. [3-0; 3-0]

335. (3) *French-Canadian Civilization.*—A thematic approach to French-Canadian literary works considered in a broad cultural context. [3-0; 3-0]

400. (3) *A Survey of French Literature in Translation.*—Not available for credit toward a Major or Honours program in French. [3-0; 3-0]

401. (3) *Fourth-Year Honours Seminar.*—To be taken in the Fourth Year by all Honours students specializing in literature. [2-0; 2-0]

402. (3) *Advanced Studies in French Language and Style, III.*—Stylistics, textual analysis, translation. Prerequisite: French 302. [3-0; 3-0]

403. (3) *Survey of French-Canadian Literature in Translation.*—Not available for credit toward a Major or Honours program in French. [3-0; 3-0]

404. (3) *Seminar in Advanced Composition and Translation.*—A course intended to extend and refine the advanced student's written expression of the French language. Prerequisite: French 302 or permission of the Department. [3-0; 3-0]

405. (3) *Modern French: A Linguistic View*.—Grammatical analysis and description of the contemporary language concentrating upon morphology and syntax. Prerequisite: French 302 and 306 (French 306 may be taken concurrently, with permission of the Department). [3-0; 3-0]

407. (3) *Mediaeval French Literature*.—Representative literary texts from the eleventh to the fifteenth century. [3-0; 3-0]

408. (3) *Literature of the Sixteenth Century*.—The French Renaissance, including Rabelais, Ronsard and Montaigne. [3-0; 3-0]

409. (3) *Literature of the Seventeenth Century*. Representative authors with emphasis on Corneille, Racine, Molière, Descartes, Pascal and La Fontaine. [3-0; 3-0]

410. (3) *Literature of the Eighteenth Century*.—The drama, the novel and the basic writings of Montesquieu, Voltaire, Diderot and Rousseau. [3-0; 3-0]

411. (3) *Poetry and Drama of the Nineteenth Century*.—Representative works and significant trends. [3-0; 3-0]

412. (3) *The Nineteenth-Century Novel*.—Representative texts and significant trends. [3-0; 3-0]

414. (3) *Twentieth-Century Drama*.—Representative works and significant trends. [3-0; 3-0]

415. (3) *The Twentieth-Century Novel*.—Representative works and significant trends. [3-0; 3-0]

416. (3) *French-Canadian Literature*.—Characteristic works, from its origins to the present. [3-0; 3-0]

417. (3) *Twentieth-Century French Poetry*.—Representative works and significant trends. [3-0; 3-0]

418. (3) *Literatures of the French-Speaking World*.—An introduction to representative works written in French by authors native to Africa, the Caribbean, etc., with emphasis on the evolution of post-colonial literature and the socio-historical context of each work. [3-0; 3-0]

419. (3) *Women's Literature in France and French Canada*.—Representative French women writers from the Middle Ages to the present; contemporary women writers in French Canada. [3-0; 3-0]

420. (1½-3)**c** *French Literature*.Selected topics.

421. (1½-3)**c** *French-Canadian Literature*.—Selected topics. Prerequisite: French 335 or French 416.

422. (1½-3)**c** *French Language*.—Selected topics.

423. (3) *Advanced Translation: French to English*.—This course is intended to give a wide-ranging and thorough foundation in both literary and technical translation from French to English. Must be taken concurrently with French 424. Available only to students enrolled in the Diploma Program in Translation. [3-0; 3-0]

424. (3) *Advanced Translation: English to French*.—This course is intended to give a wide-ranging and thorough foundation in both literary and technical translation from English to French. Must be taken concurrently with French 423. Available only to students enrolled in the Diploma Program in Translation. [3-0; 3-0]

426. (3) *Comparative French and English Stylistics*.—Detailed comparative study of characteristic French and English forms of expression. Available only to students enrolled in the Diploma Program in Translation. [3-0; 3-0]

427. (3) *Seminar in Advanced Translation*.—Available only to students enrolled in the Diploma Program in Translation. [3-0; 3-0]

429. (3) *Translation Project*.—A major practical exercise in translation: French to English or English to French. Available only to students enrolled in the Diploma Program in Translation.

449. (3-6)**c** *Honours Essay*.

500. (1½) *Methods of Bibliography and Research*.

501. (1½/3)**c** *Studies in the Literature of Mediaeval France*.

502. (1½/3)**c** *Studies in Sixteenth-Century Literature*.

503. (1½/3)**d** *Studies in Seventeenth-Century Literature*.

504. (1½/3)**d** *Studies in the Seventeenth-Century Novel*.

505. (1½/3)**d** *Studies in Seventeenth-Century Drama*.

506. (1½/3)**d** *Studies in the Eighteenth-Century Novel*.

507. (1½/3)**c** *Studies in the French Enlightenment*.

508. (1½/3)**d** *Studies in French Romantic Literature*.

509. (1½/3)**d** *Studies in Post-Romantic Nineteenth-Century Literature*.

510. (1½/3)**d** *Baudelaire and the Symbolists*.

511. (1½/3)**d** *Studies in Contemporary French Literature*.

512. (1½/3)**d** *Studies in Literary Criticism*.

513. (1½/3)**d** *Studies in French-Canadian Literature*.

514. (1½/3)**d** *Problems relating to the French Novel*.

515. (1½/3)**c** *Studies in Romance Philology*.

516. (1½/3)**c** *Studies in the History of the French Language*.

519. (1½/3)**c** *The Language and Literature of Old Provençal*.

520. (1½/3/6)**c** *French Language and Literature*.

521. (1½/3)**d** *Studies in the Literature of the French-Speaking World*.

522. (1½/3)**c** *Studies in French and Comparative Stylistics*.

549. (3/6)**c** *Master's Thesis*.

649. *Ph.D. Thesis*.

Genetics—See also Faculty of Graduate Studies and courses listed under Medical Genetics

501. (1½) *Genetics*.—A lecture series intended to acquaint graduate genetics students and those in related areas with advances in genetics and an overview of genetics in a variety of systems. The emphasis is on molecular genetics. Required of students in the graduate genetics program. Prerequisites: Biology 334 or equivalent and a third year course in Biochemistry.

502. (1½) *Genetics*.—A lecture series intended to acquaint graduate genetics students and those in related areas with advances in genetics and an overview of genetics in a variety of systems. The emphasis is on eukaryotic genetics. Required of students in the graduate genetics program. Prerequisites: Biology 334 or equivalent and a third year course in Biochemistry.

549. (3/6)**c** *M.Sc. Thesis*.

649. *Ph.D Thesis*.

Geography (Faculty of Arts)

Note: Students registered in the B.Sc. program in Geography may receive Arts credit for no more than two of the following courses: Geography 110, 190, 220, 260, 324, 327, 328, 337, 350, 351, 360, and 361. These are the only Geography courses that will be considered as Arts electives for the B.Sc. degree in Geography.
*** Courses which have Science credit are preceded by an asterisk.**

*101. (3) *Introduction to Physical Geography*.—An introduction to the physical environment. The basic physical principles and processes that govern climate-landform-vegetation-soil systems on the surface of the earth. Natural and man-induced changes in environmental systems through time. Laboratory exercises cover techniques of measurement, representation, and analysis of environmental characteristics, and include map construction, map and air photo interpretation, and field observations. [3-2; 3-2]

110. (1½) *Introduction to Man-Environment Systems*.—The interrelationships between man and the major natural and modified physical environmental systems. [2-1; 0-0] or [0-0; 2-1]

190. (1½) *Introduction to the Geography of Canada*.—Selected topics in human geography focusing on the regional distribution of natural resources, population, urban systems and economic activities. [3-0; 0-0] or [0-0; 3-0]

*202. (1½) *Introduction to Climatology*.—An introduction to the atmospheric variables and the processes governing their distributions in the Earth-Atmosphere system. Atmospheric energy, moisture and motion. Prerequisite: Geography 101 or the first year of a B.Sc. degree. (Credit may not be obtained for both Geography 212 and Geography 214.) [3-2; 0-0]

*205. (1½) *Introduction to Hydrology*.—Principles of hydrology at site, watershed and larger regional scales. Introduction to techniques of measurement and analysis. Emphasizes surface water hydrology of western North America. Prerequisite: Geography 202 and 3 units of Physics. Credit will be given for only one of Geography 205 and 313. [0-0; 2-2]

214. (1½) *Forest and Agricultural Climatology*.—(Mainly for students in the Faculty of Forestry and Agricultural Sciences)—An introduction to the basic principles and processes of climatology. Energy and water balance concepts. Motion and weather systems. Microclimate of soils, crops, forests and animals. Microclimate modification and air pollution. Climate classification and land capability. (Same as Soil Science 214. Forestry students register in Geography 214. Credit may not be obtained for both Geography 214 and Geography 202). [3-2; 0-0]

220. (1½) *Geographical Change in Modernizing Societies*.—Introduction to modern cultural, social and historical geography through a comparative analysis of the changing geographies of modernizing societies in Northwestern Europe, Canada, Latin America, and East Asia. [3-1; 0-0] or [0-0; 3-1]

260. (1½) *Geography of Economic Activity*.—Description and analysis, of the location of resource production and processing, trade and service centres and of urban and regional development with emphasis upon Canada in its North American and world setting. [3-1; 0-0] or [0-0; 3-1]

*301. (1½) *Micrometeorology*.—Microscale balances of energy and mass. Short- and long-wave radiation, soil heat flux and turbulent transport in the lower atmosphere. The microclimate of snow, water, soil, and vegetated surfaces. Prerequisite: Geography 202 and 3 units of Physics. [3-0; 0-0]

*302. (1½) *Synoptic Meteorology*.—Study of the genesis and characteristics of air masses, fronts, upper air waves and their influence on surface weather conditions. The observational and computational basis of modern weather forecasting. Prerequisite: Geography 202 and 3 units of Physics. [0-0; 2-2]

*303. (1) *Weather Seminar*.—Analysis and discussion of the synoptic and local weather conditions for the preceding and forthcoming week using surface and upper air charts and satellite imagery. Students will share the responsibility for both preparing charts and leading the discussion, and will attend at least two briefings at the Vancouver Weather Office. Prerequisite: 3 units of Physics or permission of Head of Department. [0-2-1; 0-0-0] or [0-0-0; 0-2-1]

*305. (1½) *Introduction to Hydrology*.—Principles of hydrology at site, watershed and larger regional scales. Introduction to techniques of measurement and analysis. Emphasizes surface water hydrology of western North America. Prerequisite: Geography 202 and 3 units of Physics. This course is available only for Geography majors who passed Geography 213 in the previous year. [0-0; 2-2]

*306. (1½) *Introduction to Physiography*.—The historical development of the major concepts in physiography; structure process and stage as landform controls; emphasis upon landform assemblages resulting from hydrologic processes; regional physiography. Prerequi-

site: Geography 101 or Geology 105. Credit will be given for only one of Geography306 and its predecessor Geography 213. [3-2; 0-0]

*308. (1½) *Quaternary and Applied Geomorphology*.—Landscape development during the Quaternary Era, emphasizing the history of glaciation with special reference to western North America; applications of geomorphological information in resource development and land management, emphasizing interpretation of Quaternary materials. Students will be required to attend weekend field trips. Prerequisite: Soil Science 200; Geography 306 or Geology 351 or permission of Head of Department. (Same as Soil Science 308). [0-0; 3-1]

*309. (1½) *Physical Geography Field Course*.—Field practice, surveying techniques, field instrumentation and mapping of elements of the physical environment. The course will include two hours of lectures per week and some weekend field trips during the Spring Term of the student's third year and two weeks' residence at a field camp immediately following the Spring examination period of the third year. A fee, to be paid by January 31, will be charged to cover the cost of accommodation and food (See Index for Fees "Special Fees"); students will be responsible for transportation to and from the field camp and for liability insurance. Students should preregister with the Department of Geography during the first term of their third year; they will not obtain credit until their fourth year. Prerequisites: Geography 202 or 205. [0-0; 2-2]

310. (1½) *Environment and Resources*.—Concepts of environment and resource; the role of physical geography in understanding the interaction of Man and the environment; introduction to the management of environment-resource systems. Prerequisite: Geography 101 or permission of Head of Department. [3-0; 0-0] or [0-0; 3-0]

315. (1½) *Environmental Inventory and Classification*.—Classification and inventory of those biophysical elements which influence people's use of air, land and water. Prerequisite: Geography 101 or permission of Head of Department. [0-0; 1½-1½]

317. (1½) *The Physical Environment of British Columbia*.—The biophysical processes which are shaping and have shaped British Columbia. The characteristic associations between landforms, climate, soil and vegetation, biophysical constraints on air, land and water use in the province. Prerequisite: Geography 101 or permission of Head of Department. [0-0; 3-0]

320. (1½) *Cultural Geography of Canada and the United States*.—Contemporary landscapes and land uses considered in relation to the economy, technology, and values of Canada and the U.S. Prerequisite: Geography 220 or permission of Head of Department. [2-1; 0-0] or [0-0; 2-1]

324. (1½) *Cultural Geography*.—Geographic aspects of culture; culture areas and cultural landscapes; patterns and processes of cultural change; cultural ecology. Prerequisite: Geography 220. [3-0; 0-0] or [0-0; 3-0]

327. (1½) *Historical Geography of Canada, I: Canada Before 1850*.—Canada from the beginning of European contact to the mid 19th century, stressing the changing geographical patterns of settlement, economy, and culture. [3-0; 0-0]

328. (1½) *Historical Geography of Canada, II: Canada After 1850*.—The spread of settlement, the growth of towns, and the development of economic and cultural regions in a Canada increasingly influenced by industrialization. [0-0; 3-0]

329. (1½) *Introduction to Political Geography*.—The heritage of political geography; the spatial structure of political organization including notions of territoriality and hierarchy, centrality and nodes, boundaries and frontiers, global structures. Prerequisite: Geography 220 or 260; also open without special permission to majors and honours students in History, International Relations and Political Science. [3-0; 0-0]

330. (3) *Our Natural Environment*.—Human impact on the atmospheric and surface environments; surface and subsurface hydrology; stream channels and floods; landslides and avalanches; glacial processes; solar energy; climate and climatic change; ecosystems; people as ecosystem controllers. Interactions among climatic, hydrologic, geomorphic and biotic factors in selected North American environments. For third- and fourth-year students. Not to be taken for credit by students registered in either Science or Applied Science, nor by students who have taken or who are required to take Geography 101. [3-0; 3-0]

345. (1½) *Geographic Thought and Practice*.—An overview of philosophical and methodological questions in twentieth-century geography; the employment of geographers. Provides a context in which to place other geography courses. Open to Geography Majors and Geography concentrations in Education. [2-2; 0-0]

350. (1½) *Introduction to Urban Geography*.—City systems and theories of urban location; internal spatial structure of the city; commercial and industrial location; social areas; mobility patterns; neighbourhood and land use change; urban trends, land use problems, and public policy. Prerequisite: Geography 220 or 260 or permission of Head of Department. [3-0; 0-0] or [0-0; 3-0]

351. (1½) *Geography of Urbanization*.—Geographic perspectives on the growth of urban regions: pre-industrial cities, urban growth during industrialization, anti-urban reaction, problems of the modern metropolitan region. Prerequisite: Geography 220 or 260. [3-0; 0-0] or [0-0; 3-0]

352. (1½) *The Geography of Third World Urbanization*.—Urbanization in the developing countries of Latin America, Africa and Asia; the role of cities in the development process and the features and problems of rapid urbanization. [3-0; 0-0]

357. (1½) *Introduction to Social and Behavioural Geography*.—The development of social and behavioural geography; focus on such topics as environmental perception and microgeography, approached from institutional and interactionist perspectives. Prerequisite: Geography 110 or 220, or permission of Head of Department. [3-0; 0-0]

360. (1½) *Geography of Manufacturing, Retail, and Service Activities*.—The location of industry and the effect of the geography of resources and markets on this location. Introduction to the methods of locational analysis of economic activity using case studies; review of theories of location, size and linkages in production. Prerequisite: Geography 260. [3-0; 0-0]

361. (1½) *Introduction to Regional Analysis*.—The nature of regions and regional economic systems; data sources for regional study in Canada; techniques for describing and analyzing regional economics. Prerequisite: Geography 260. [3-0; 0-0]

362. (1½) *Geography of Economic Development*.—Geographical approaches to economic development; models of economic development and spatial change; influences on spatial economic change; case studies from the developed, third, and socialist worlds. Prerequisite: Geography 220 or 260 or permission of Head of Department. [2-1; 0-0]

363. (1½) *The Geography of Resource Industries*.—Geographical analysis of selected resource industries of importance to Canada. Each year a selection will be made from the agriculture, forestry, fishing, mining, energy and recreation sectors which will be dealt with in international and national contexts. Prerequisite: Geography 260 or permission of Head of Department. [3-0; 0-0]

370. (1½) *Air Photograph Analysis*.—Aerial photography; measurement from aerial photographs; photo-interpretation in geographic analysis; remote sensing of the earth's surface and atmosphere. Prerequisite: Geography 101 or Geology 105. [2-2; 0-0]

371. (1½) *Research Techniques in Geography*.—Methods for observing, recording and analyzing data; research methodologies with emphasis on behavioural research in geography. [0-0; 3-0]

372. (1½) *Cartography*.—Cartographic methods: development of cartography; projections; data ordering, compilation and symbolization; cartographic design, map reproduction. Prerequisite: Geography 101 or permission of Head of Department. [2-2; 0-0] or [0-0; 2-2]

374. (1½) *Statistics in Geography I*.—Introduction to statistical techniques and their application to geographical problems. [3-2; 0-0]

375. (1½) *Spatial Data Analysis*.—Introduction to computer programming and statistical techniques for managing, analyzing and mapping spatial data; survey of topics complemented by assignments using package computer programs and geographical information systems. Prerequisite: Any one of Geography 370, 371, 372; or Geography 374; or equivalent. [0-0; 2-2]

385. (1½) *Geography of China*.—An introduction to the changing cultural, social and economic geography of China. Prerequisite: Geography 220 or permission of Head of Department. [3-0; 0-0]

386. (1½) *Introduction to the Geography of Monsoon Asia*.—A comparative regional analysis stressing the historical development and changing cultural, economic and political patterns of the area. Special reference to India, Malaysia, China and Japan. [3-0; 0-0]

390. (1½/3)**d** *Geography of Selected Regions*.—A geographical analysis of selected regions not regularly included in the Department's offerings in regional geography (e.g. tropical Africa, Europe, Oceania). Students should consult the Department regarding regions to be covered. [3-0] or [3-0; 3-0]

394. (1½) *Geography of the Soviet Union: Thematic Analysis*.—Physical environment and natural resources; distribution of population and economic activities: their historical origins and the impact of Soviet rule. [3-0; 0-0]

395. (1½) *Introduction to the Geography of Latin America*.—Physical environment, current demographic and cultural patterns in Middle and South America, trends in the settlement and resource use from earliest entries to the present; North American comparisons. [3-0; 0-0]

*401. (1½) *Urban Meteorology*.—The impact of urbanization upon atmospheric processes and climates. The energy and water balances of cities. Meteorological effects (urban heat island, precipitation enhancement, etc.) and their significance. Models of the urban atmosphere. (401/402 given in alternate years). Prerequisite: Geography 301 or permission of Head of Department. [2-2; 0-0]

*402. (1½) *Air Pollution Meteorology*.—The nature of atmospheric pollutants. The ability of the atmosphere to disperse, transform and remove pollutants. Air pollution dispersion models. Air quality monitoring, criteria and standards. (401/402 given in alternate years). Prerequisite: Geography 301 or 302 or permission of Head of Department. [0-0; 2-2]

*403. (1½) *Solar Radiation Climatology*.—Determinants and characteristics of the spatial and temporal distributions of solar energy; measurement and numerical modelling techniques; data archives; solar radiation climatologies of the Earth, North America, Canada and British Columbia. Prerequisites: Geography 202 (former 212) and 3 units of Physics or permission of Head. [0-0; 2-2]

*405. (1½) *Fluvial Geomorphology*.—Introduction to open channel flow and sediment transport. River morphology and channel types. Paleohydrology. The development of channel networks. (405/406 given in alternate years.) Prerequisite: Geography 306. [0-0; 2-2]

*406. (1½) *Slopes*.—Hillslope processes and their rates of operation. Spectrum of geomorphic events on slopes and phenomena resulting from instability on soil and snow slopes. Slope evolution over long time periods. (405/406 given in alternate years). Prerequisite: Geography 306. [0-0; 2-2]

*407. (1½/2)**c** *Directed Studies in Physical Geography*.—A course for fourth year students in Geography designed to permit them to undertake an investigation of a topic to be agreed upon by a member of the faculty and the student. Permission of the Head and of the supervising faculty member is required. Credit will be given for only one of Geography 407 and 448.

*409. (1½) *Climatological Analysis*.—Observation and instrumentation. Statistical analysis and climatological models. Applications of basic techniques of climatological analysis to atmospheric phenomena on the micro-, meso-, and macro-scales. Prerequisite: Geography 301. [0-0; 2-2]

410. (1½) *Geography and Resource Management*.—Geographical analysis of complex man-environment systems. Illustration of the roles of physical process, institutional framework and technology in the interaction of Man and environment at several scales. Prerequisite: Geography 310 or permission of Head of Department. [0-0; 3-0]

415. (1½) *Environmental Quality and Impact Assessment*.—Environmental quality from the standpoints of human perception, governmental standards, methods of measurement, impact assessment and strategies for the enhancement of quality. Case studies are drawn

primarily from North America. Prerequisite: Geography 310 or permission of Head of Department. [3-0; 0-0]

417. (1½) *Physical Environment of the City*.—The impact of urbanization upon the natural environment and vice versa. Aspects of urban climate, soils, hydrology, physiography, vegetation and wildlife. Urban metabolism, pollution, waste management and natural hazards. Past, present and future urban environments. Prerequisite: Geography 310 or permission of Head of Department. [0-0; 3-0]

418. (1½) *Environmental Change*.—Changes in the physical environment in terms of long term (e.g. climatic change), short term (e.g. river channel changes), intermittent (e.g. landslides and avalanches) and sequential (e.g. plant successions) environmental changes. Emphasis on the role of and impacts on people. Prerequisite: Geography 310 or permission of Head of Department. [3-0; 0-0]

423. (1½) *Attitudes toward the Environment*.—An examination of attitudes that have influenced land use and environmental change in the past and present. Prerequisite: Geography 320. [0-0; 1-2]

424. (1½) *Medical Geography*.—Regional patterns of health and disease; the relationships among biological, physical and cultural factors in the variety of human habitats. [0-0; 3-0]

425. (1½) *Landscape and Life in Imperial China*.—The historical geography of China emphasizing the spatial structure and geographical foundations of the imperial order, the history of landscape design in the gentry-urban tradition, and case histories of urban life in medieval and late imperial periods. [0-0; 3-0]

427. (3) *Environment and Society in Early British Columbia*.—An interpretation of the changing human geography of British Columbia from Captain Cook to the Great Depression. Field trips. [2-1; 1-2]

431. (3) *Introduction to Geographical Problems*.—An introduction to current themes and issues in geography. For students in fourth year majoring in fields other than geography. Not credited towards the geography major. [3-0; 3-0]

445. (1½) *Spatial Analysis and Scientific Explanation*.—Examination of the spatial-analysis school of geography in relation to the strengths and weaknesses of the natural science paradigm. Prerequisite: Geography 345. [0-0; 2-1]

448. (1½) *Directed Studies in Geography*.—For fourth-year students in Geography to permit investigation of a topic to be agreed upon by a member of the faculty and the student. Prerequisite: Permission of the Head and of the supervising faculty member. Credit available for only one of Geography 407 and 448.

*449. (1½/3)**d** *Honours Essay*.—Carries 3 units Arts credit for students in Arts and 3 units Science credit for students in Faculty of Science, except for Honours Climatology students, who will receive only 1½ units Science credit.

450. (1½) *Urban Analysis*.—Geographic analysis of selected problems of the internal structure of cities and urban systems. Prerequisite: Geography 350. [2-1; 0-0]

453. (1½) *Political Geography of the City*.—The political organization of space at the metropolitan scale. The development and consequences of the present spatial structure of political units in metropolitan areas. Attempts at spatial reorganization in Canadian and American urban areas. Locational aspects of local government decision-making and related conflicts. Prerequisite: Geography 350 or 329. [0-0; 3-0]

457. (1½) *Social and Behavioural Geography*.—Traditions in social geography; the French school; the concept of place; social space; class, caste, and spatial behaviour; urban perception; controlling urban space; territorial groups; urban behaviour settings; decision-making worlds in the city; urban microstudies in North America and Europe; the meaning of the city. Prerequisite: Geography 350 or 357. [0-0; 3-0]

461. (1½) *Geography, Governments and Regional Development*.—The effects of political-economic institutions and government policies on regional development. Prerequisite: Geography 361 or 362. [0-0; 3-0]

464. (1½) *Spatial Interaction*.—The concepts of distance and accessibility; theories relating to diffusion, commodity flow and human travel behaviour, and their application to economic activity analysis. Prerequisite: Geography 350 or 360. [0-0; 3-0]

467. (1½) *Geography of Energy*.—Analysis of the energy industry; patterns of energy demand and supply in Canada; current energy policy issues including environmental considerations, the potential of alternative sources and conservation. [3-0; 0-0]

468. (1½) *Geography of International Economic Systems: Canada and the Pacific Basin*.—An introduction to the study of international economic systems illustrated by the study of Canada's relations with the countries located in the Pacific Basin. [2-1; 0-0]

470. (1½) *Remote Sensing in Geographical Enquiry*.—Conventional aerial photographs and their applications in mapping; remote sensing from orbital and airborne platforms; characteristics and interpretation of photographic and non-photographic imagery; sample applications in land inventory and resource management. [0-0; 2-2]

471. (1½) *Landscape Interpretation*.—Advanced interpretation of cultural landscapes, based upon written analysis and photography, and with reference to recent trends in geographical literature. Field and laboratory work. Access to adjustable camera required. Limited enrollment. Prerequisite: Geography 220 or permission of Head of Department. [2-2;0-0]

481. (1½) *Geography of Japan*.—A critical analysis of significant human adaptations to changing ecological conditions in the Japanese archipelago. Prerequisite: Geography 220. [0-0; 3-0]

483. (1½) *Geography of South Asia*.—A critical analysis of significant human adaptations to changing ecological conditions in the Indian subcontinent. Prerequisite: Geography 220. [3-0; 0-0]

484. (1½) *Geography of Southeast Asia*.—A critical analysis of significant human adaptations to changing ecological conditions in the region, with particular reference to the Malay World. Prerequisite: Geography 220. [0-0; 3-0]

491. (3) *Geography of the Pacific Northwest*.—Regional geography with emphasis on British Columbia and the Northwest States: physical and cultural elements, patterns, and problems of location and use of resources. Field trips. [3-0; 3-0]

493. (1½) *Geography of Eastern Europe*.—Physical environment and natural resources; distribution of population and economic activities: present-day patterns and their historical origins; current problems of regional development. The region is taken to comprise the COMECON countries (excluding the Soviet Union) plus Yugoslavia and Albania. [0-0; 3-0]

494. (1½) *Geography of the Soviet Union: Regional Analysis*.—Principles and practices of Soviet regional development; selected current problems, with a particular focus on Siberia and the Soviet Far East. Prerequisite: Geography 394. [0-0; 3-0]

495. (1½) *Selected Latin American Habitats*.—Physical environment, inhabitants, and livelihood systems along transects from densely settled uplands to tropical lowlands in Middle and South America; altitudinal interrelationships; changing man-land interaction from earliest entries to the present and associated changes in landscape. [0-0; 3-0]

497. (1½) *Geography of the Canadian Arctic*.—The patterns of physical and human geography in Canada's northland; the impact of the physical environment on the human occupancy of the north; exploration, trade and settlement; northern resources; current economic and social problems. [3-0; 0-0]

499. (3) *Geography of Canada*.—Selected aspects of six regions of Canada; physical environment, natural resources, primary industries, urban patterns. Course will stress the regional method of study. [3-0; 3-0]

*500. (1½) *Physical Geography*.—Contemporary research trends in physical geography. Description and identification of environmental systems. Appropriate measurement and sampling designs in physical geography.

506. (1½) *Human Geography*.—A wide-ranging exploration of some themes and interpretative issues that pervade modern human geography.

510. (1½/3)**d** *Spatial and Cartographic Techniques*.—Analysis of spatial data involving statistical methods, mathematical modelling and computer mapping, with emphasis on cartographic analysis and display of data.

515. (1½) *The Conduct of Geographical Enquiry*.—Basic concepts, problems and methods in scientific and humanistic enquiry in Geography.

*520. (1½/3)**d** *Geomorphological Processes*.—Processes of landscape evolution. Mass-wasting and slope evolution; fluvial hydraulics and river morphology; coastal geomorphology; glacial erosion and deposition of debris by glacial ice. Models of landscape evolution. One or two topics only in each term.

*521. (1½) *Permafrost*.—Occurrence and characteristics of frozen ground, with particular reference to ground ice. Climatic and other environmental determinants of geocryological phenomena. Theory of ground ice formation. Classification of patterned ground.

*522. (1½) *Watershed Geomorphology*.—The drainage basin as a fundamental unit of geomorphic enquiry. The role of representative and experimental basins. Sediment sinks and sources; mass fluxes of sediment and sediment routing models.

*525. (1½) *Atmospheric Environments*.—The nature of the energy and mass exchanges basic to an understanding of atmospheric environments. The relation of these processes to the characteristics of climates at the micro-, meso- and macro-scales. Relevant measurement and modelling considerations.

*526. (1½) *Satellite Remote Sensing Applications to Oceanography and Meteorology*.—A review of the many satellite-sensed data products used in both research and operational aspects of oceanography and meteorology. Credit will be given for only one of Geography 526, Oceanography 526 as they are identical courses.

530. (1½) *Urban Geography*.—Various approaches to the geographic analysis of the city; with particular attention to methodological issues and to the Canadian city.

531. (1½) *Economic Geography*.—Review and discussion of recent literature and current developments in the study of the spatial organization of economic activity.

532. (1½) *Advanced Economic Geography*.—Current issues in economic geography.

533. (1½) *Spatial Interaction*.—Theory and analysis of spatial interaction.

534. (1½) *Transportation Networks*.—Theory and analysis of transportation networks.

540. (1½) *Social and Behavioural Geography*.—Social and behavioural theory as developed by geographers in the context of contemporary urban society.

541. (1½) *Problems in Social Geography*.—A seminar examining empirical research in social geography, including such areas as the geography of social problems, the quality of life, the geography of minority groups, migration and tourism, and the experience of place.

542. (1½) *Urban Political Geography*.—The spatial structure of local government in urban areas; location conflict; voting patterns; environmental quality and urban policy making.

543. (1½) *Historical Geography*.—A survey of the principal literature and research methods in historical geography.

544. (1½/3)**d** *Historical Geography of European Settlement in North America*.—Dominant social, technological, economic, and intellectual influences on the geography of early European settlement in North America.

547. (1½) *Cultural Geography*.—Traditions, methods, and problems in cultural geography, with an emphasis on technology and landscape.

548. (1½) *Advanced Cultural Geography*.—Directed research in cultural geography.

550. (1½/3)**c** *Directed Reading*.

*555. (1½) *Directed Studies in Physical Geography*.—A course of directed studies in a specific problem area within physical geography.

*560. (1½/3)**d** *Heat and Water Balance Climatology*.—The interaction between the atmospheric boundary layer and the earth's surface. Atmospheric systems viewed in terms of the energy and water balance frameworks. Processes of energy and mass transfer in the boundary layer, and their relative importance in determining the micro- and meso-climates of different surface environments. Current developments in atmospheric theory and measurement.

*561. (1½) *Regional Hydrology*.—Regional scale investigation of hydrologic problems

emphasizing the water balance approach, design of hydrometric networks, application of hydrometric data to water development and protection and models for decision making.

570. (1½/3)**d** *Research Seminar in Economic Geography*.—Formulation, development, and execution of a research project in economic geography.

571. (1½/3)**d** *Research Seminar in Urban Geography*.—Current issues in the geography of the city.

573. (1½/3)**d** *Research Seminar in Historical Geography*.—Current issues in historical geography.

575. (1½/3)**d** *Research Seminar in Regional Geography*.—Directed studies in the contemporary or historical geography of selected world regions.

599. (6) *Master's Thesis*.

600. *Doctoral Research Seminar*.

699. *Ph.D. Thesis*.

Geological Sciences (Faculty of Science)

Note: Geology 105 (or 150 or Geology 125 plus Geophysics 120) is prerequisite for all other courses in Geology except Geology 310. Students taking courses in Geological Sciences may be required to participate in field trips.

**Additional fees are charged for these courses. See "Special Fees" P. 22.

Geology

105. (3) *Physical and Historical Geology*.—Origin and structure of the earth, materials of the earth, diastrophism, erosion, land forms, mineral deposits, petroleum, natural gas, coal, ground water, fossils, meteorites, engineering and environmental geology, history of the earth and the development of life. [3-2; 3-2]

125. (1½) *The Physical and Chemical Evolution of the Earth*.—The chemical composition of earth and the solar system. Crystal chemistry. Common and economic minerals. Changes produced in the earth by melting of rock and metamorphism. Mountain belts. Sedimentary and erosional processes. Fossils and earth evolution. Geologic time. Natural resources, sources and limits. Prerequisite: Geophysics 120. [0-0-0; 2-1-3]

150. (1½) *Earth Science for Engineers*.—Principles and techniques of geology applied to engineering with special emphasis on earth materials and processes related to man's activities on the earth's surface. For Applied Science and Forestry students only. [3-2-0; 0-0-0] or [0-0-0; 3-2-0]

**200. (1½) *Mineralogy I*.—Introduction to crystallography, physical and chemical properties of minerals. Recognition and identification of common minerals. Prerequisites: Geology 105, 125, or 150; Chemistry 120 or 110; Physics 120, 115, or 110. [2-3; 0-0]

**201. (1½) *Optical Mineralogy*.—Study of the common rock-forming minerals in thin-section using the polarizing microscope. Prerequisite: Geology 200. [2-3-0; 0-0-0]

206. (1½) *Stratigraphy*.—Physical and biological stratigraphy; facies and correlation; sequence concepts and basin analysis. Prerequisite: Geology 105, 125 or 150 or Geography 101. [2-2-0; 0-0-0]

**226. (1½) *Sedimentology*.—Origin, diagenesis and geochemistry of sediments and sedimentary rocks. Prerequisite: Geology 206. [0-0; 2-2]

235. (0) *Field Techniques*.—Introduction to the techniques of geological field mapping and use of related instruments. Three days during the spring term, scheduled on fair-weather weekends. Prerequisite for Geology 435 Field Geology. [0-0-0; 3 days]

**256. (1½) *Stratigraphy and Sedimentology*.—Introduction to stratigraphy, sediments and sedimentary rocks; facies and correlation, diagenesis, introductory petrology of sedimentary rocks; sedimentary mineral deposits and energy resources. Prerequisite: Geology 150, 105 or 125, Geography 101. [0-0-0; 2-2-0]

302. (1½) *Igneous Petrology*.—Nature and origin of the common igneous rocks. Prerequisite: Geology 201. [2-3-0; 0-0-0]

**303. (1½) *Metamorphic Petrology*.—Nature and origin of the common metamorphic rocks. Prerequisite: Geology 201. [0-0-0; 2-3-0]

304. (3) *Structural Geology I*.—Analysis and interpretation of natural deformation. Prerequisite: Geology 201, 206 or 256. [2-3; 2-3]

305. (1½) *Interpretation of Aerial Photographs*.—Practical applications of the use of aerial photographs for geologists and geological engineers. Prerequisite: Geology 206 or 256. [0-0; 2-3]

308. (1½) *Introduction to Mineralogy and Petrology*.—The common minerals and rocks, and the processes that formed them. Not for credit for students in Geological Sciences or in the Geological Engineering. Credit will not be given for Geology 308 and 200. [2-2-0; 0-0-0]

309. (1½) *Mineralogy II*.—Fundamental of crystal chemistry, structural variations, composition and stability of minerals; modern analytical techniques in mineralogy. Prerequisites: Geology 200; Chemistry 208. [0-0; 2-3]

310. (3) *Canadian Geology: Our Environment and Resources*.—A course to provide a general understanding, without involving laboratory science, of our natural geological surroundings. The geology of a region has a profound bearing on the distribution of natural resources and hence on their exploitation, and is also a major factor in setting the nature of the environment. The course considers the origin and evolution of the different regions of Canada to illustrate basic geological processes and their influence on man. Suitable for students in third and fourth year, but not offered for credit in Earth Science departments and thus not acceptable as "Earth Science 300 or above" credit in the Faculty of Science General B.Sc. Program. [3-0; 3-0]

312. (1) *Environmental Geology*.—The interactions between people and the geological aspects of their environment. Designed for non-geologists. Not for credit for students in Geological Sciences or Geological Engineering. Prerequisite: Geology 105 or Geography 101. [0-0; 2-0]

315. (1½) *Geological Analysis*.—An introduction to the use of mathematical techniques in geology: geostatistical analysis, mathematical simulation of geologic processes. Prerequisite: Mathematics 200; Statistics 105; Geology 200 and one of 226 or 256. [0-0-0; 3-0-2]

**321. (1½) *Paleontology I*.—Fossils as evidences of ancient living populations; description, classification and identification: arrivals, survival and extinctions in the contexts of ecology and time. Prerequisites: Geology 226 or 256. [2-2; 0-0]

323. (1½) *Introductory Geochemistry*.—Origin, distribution and cycles of elements in the earth; evolution of the ocean and atmosphere; introduction to low temperature aqueous solution geochemistry. Prerequisites: Geology 200; Chemistry 208. [2-0-2; 0-0-0]

330. (1½) *X-Ray Mineralogy*.—Fundamentals of x-ray crystallography with emphasis on powder diffractometry in the solution of mineralogical problems; qualitative x-ray fluorescence spectrometry; electron microprobe; energy dispersive methods. Prerequisites: Chemistry 208, Geology 200. [0-0; 2-3]

333. (1½) *Analytical Geochemistry*.—Application of chemical and instrumental methods to the analysis of silicate rocks and minerals; sampling problems in geochemistry. Prerequisite: Geology 200. [0-0; 2-3]

**335. (1½) *Field Geology*.—Methods of observing, recording, and correlating geological data in the field. Held in the 3 weeks immediately following the Spring examination period of the Third year. Transportation to and from the Field School is the responsibility of the Student. A fee is to be paid by January 31. The Department provides room, board and transportation in the field. Fourth Year students who require credits from this course for graduation will not graduate at the Spring Convocation. Corequisites: Geology 235 or Civil Engineering 250; Geology 302, 304, and 305.

342. (1½) *Groundwater Hydrology*.—Introduction to theory of ground-water flow; flow nets; regional groundwater resource evaluation; well hydraulics; role of groundwater in geologic processes. [2-2*-2*; 0-0-0]

351. (1½) *Geomorphology*.—Study of the processes and principles of land formation; types of land forms and their distribution. Corequiste: Geology 304 or permission of the Head. [2-2-0; 0-0-0]

354. (1½) *Structural Geology*.—Introduction to descriptive structural geology with applications to ore controls. Not for credit for students in Geological Sciences or Geological Engineering. Prerequisites: Geology 200 or 308. [0-0-0; 2-3-0]

358. (1½) *Ore Microscopy for Mineral Engineers*.—Application of the reflecting microscope to the examination of ores and mill products. For students in Mining and Mineral Process Engineering only. Prerequisite: Geology 308. [1-3-0; 0-0-0]

368. (1½) *Mineral Exploration and Mining Geology*.—Principles underlying the search for and exploration of mineral deposits; introduction to economic geology, applied geophysics and applied geochemistry. Not for credit for students in Geological Sciences. Prerequisite: Geology 200 or 308. [2-2-0; 0-0-0]

**403. (1½) *Theoretical Petrology*.—Application of physical and chemical principles to the origin of igneous and metamorphic rocks. Topics covered include crystallization from viscous melts, heat transfer, partial melting, fractional crystallization, heat flow during metamorphism, and metamorphic and metasomatic phase equilibrium. Prerequisite: Geology 303; Corequisite Geology 405 to precede or accompany. [0-0-0; 2-3-0]

404. (1½) *Structural Geology II*.—Studies of natural deformation using advanced techniques. Prerequisites: Geology 304. [2-2; 0-0]

405. (1½) *Geomathematical Models and Computer Applications in Geology*.—Applications of mathematical modelling and geostatistical procedures to practical problems with a geological context. Prerequisites: Statistics 105 and Mathematics 200, 221 or 253, and a knowledge of computer programming. Not offered every year. [0-0-0; 2-0-2]

**406. (1½) *Advanced Sedimentology*.—Description and interpretation of ancient and modern sediments, with emphasis on the origin, composition, textures, structures, diagenesis and chemistry of terrigenous sediments. Prerequisite: Geology 201 and one of Geology 226 or 256. [2-2; 0-0]

415. (1½) *Geology of the Western Cordillera*.—Geologic history, stratigraphy and structure of the western Cordillera including the eugeosyncline and transitional areas of British Columbia, Alaska, the western United States and Baja California. Prerequisites: Geology 200; and 206 or 256. [2-0-2; 0-0-0]

**416. (1½) *Carbonate-Chert Sedimentology*.—Origin and environment of limestone, dolomite, chert, jasper and organic silica rocks; study of their textures, structures, composition, geochemistry, organic constituents, diagenesis, contribution to the geological record, economic exploitation and use. Laboratory studies of thin sections, insoluble residues, staining and peels. Prerequisites: Geology 201, 321, or permission of the Head. [0-0; 2-2]

**418. (3) *Mineral Deposits*.—Manner of occurrence, genesis, structure and distribution of the principal metallic and some non-metallic mineral deposits. Corequisite: Geology 304. [2-2; 2-2]

**421. (1½) *Paleontology II*.—Assessment of the geological impact of life both before and after the advent of hard skeletons. Fossilization processes; skeletal composition and structure; numerical taxonomy; bioerosion; biostratigraphy; and paleobiogeography in the context of plate tectonics. Prerequisite: Geology 321; or one of Geology 206 or 226, and permission of the Head. [0-0; 2-3]

425. (1½) *Geologic Evolution of North America*.—An overview of the tectonic evolution of North America with emphasis on the Phanerozoic orogenic belts, especially the Cordillera; comparison and contrast of Phanerozoic and Precambrian orogens; interrelations of sedimentation, deformation, metamorphism and magmatism; interpretation of the tectonic story in terms of plate tectonic processes. Prerequisite: 6 units of Earth Science. [0-0; 3-0]

426. (1½) *Marine Geology*.—History and methods; morphology and plate tectonics of ocean

basins; hotspots and seamount chains; processes at mid-oceanic ridges; relations between oceanic circulation and sediments; continental margins. Prerequisites: Geology 302, 304. [2-3; 0-0]

**428. (1½) *Sulfide Mineralogy and Mineralography*.—Analysis and interpretation of sulphide phase systems; mineralogy of sulphides and other opaque materials. Corequisite: Geology 418. [2-3; 0-0]

**431. (1½) *Micropaleontology*.—Morphology, geologic history and paleoenvironmental implications of geologically important calcareous, siliceous and phosphatic microfossil groups. Laboratories include preparation techniques and the examination of reference assemblages. Corequisite: Geology 421 or permission of the Head of the Department. [0-0-0; 2-3-0]

436. (1½) *Sedimentary Basin Analysis*.—Cratonic and Marginal Basins; tectonics and basement structure and composition; sedimentary and thermal histories of basins, with emphasis on the Western Canada sedimentary basin; oil and gas reserves. Prerequisite: Geology 445 or permission of the Head. [0-0-0; 2-3-0]

438. (1½) *Geochemistry of Ore Genesis*.—Geochemistry and theory of ore deposition in hydrothermal systems. Pre- or co-requisites: Chemistry 208; Geology 323, 418. Not offered every year. [0-0-0; 2-0-2]

441. (1½) *Stratigraphic Palynology*.—Study of palynomorph assemblages from late Precambrian and Phanerozoic strata, with applications of dating, correlation and environmental reconstructions. Prerequisite: Geology 206 or 256. [2-3-0; 0-0-0]

442. (1½) *Groundwater Contamination*.—Introduction to principles of groundwater chemistry; chemical evolution in natural groundwater flow systems; sources of contamination; mass transport processes; hydrochemical behaviour of contaminants; nuclear waste disposal. Prerequisite: Geology 342. [0-0-0; 2-0-2]

445. (1½) *Petroleum Geology*.—The origin, geochemistry and distribution of petroleum. Principles of exploration, evaluation and development of petroleum reservoirs and unconventional sources of petroleum. Prerequisite: Geology 256 or 206. [2-2; 0-0]

**447. (1½) *Coal Geology*.—Origin, geochemistry and distribution of coal deposits; methods of coal exploration and evolution; geology as applied to coal mining and determination of coal quality; introduction to coal petrology. Prerequisites: Geology 206 or 256. [0-0; 2-2]

448. (1½/3)**c** *Directed Studies in Geology*.—A course designed to permit students to undertake an investigation of a topic to be agreed upon by a member of the faculty and the student. Permission of the Head of the Department and of the supervising faculty member is required.

**449. (3) *Thesis*.—Honours students must submit a graduating thesis on some subject approved by the Department.

452. (1) *Geotechnical Engineering Practice*.—Application of the principles and techniques of geology, geophysics, soil mechanics and rock mechanics at engineering sites. Analysis of projects and problems on a local and regional scale. Case histories. Prerequisites: Geology 342, Civil Engineering 367, Mining and Mineral Process Engineering 356. [0-0-0; 2-0-0]

462. (1½) *Principles of Geological Engineering*.—Role of geology and hydrogeology in siting, design, and construction of engineering structures; synthesis of rock mechanics and soil mechanics methods in various geological environments; introduction to computer applications in geological engineering. Prerequisites: Geology 342, Civil Engineering 367, or permission of Head. [2-0-2; 0-0-0]

472. (1) *Applied Structural Geology in Geotechnical Engineering*.—Local and regional structural controls. Methods of processing structural data. Methods of prediction of behaviour of jointed rock masses. Applications to open-pit design. Case histories. Prerequisites: Geology 304 or 354, Mining and Mineral Process Engineering 356. [0-0-0; 2-0-0]

**499. (3) *Thesis*.—For B.A.Sc. degree.—Topic to be approved by the Department. [0-3-0; 0-3-0]

504. (1½) *Geodynamics*.—A review of plate tectonics: geometry, processes, causes and geologic consequences.

506. (1½/3)**d** *Marine Geology and Sedimentology*.—The development of ocean basins and of the sediments contained within them. Modern processes are emphasized and used as examples in the interpretation of ancient deposits.

512. (1½) *Glacial Geology and Quaternary History*.—Seminar. Characteristics, environments and histories of glacial and proglacial deposits; floral, faunal and climatic indices; isostatic and eustatic shifts in sea levels. Prerequisite: Geology 308.

513. (1½) *Geochronometry*.—History, theory, techniques, applications and interpretations of geochronometry, using naturally occurring radioactive isotopes. Radiogenic isotopes as tracers of geological processes. Discussion of current research problems involving the Canadian Cordillera, other geological examples, dating of ore deposits, evolution of oceans and continents, and results on lunar samples and meteorites. Students with special interest in this field are encouraged to take both Geophysics 423 and Geology 513. Given in alternate years.

516. (1½) *Problems in Carbonate Geology*.—Lectures, seminar and laboratory. Problems of the origin of carbonate bodies in different climatic environments. Identification of cold water and warm water carbonates and of shallow water and deep water carbonates and their associations. Given in alternate years.

520. (1½) *Problems in Sedimentology*.—Directed studies of sediments and sedimentary rocks.

521. (1½) *Problems in Paleontology*.—Seminar; principles of paleontology, taxonomy and evolution applied to selected pre-Cenozoic metazoan invertebrate groups.

523. (2) *Advanced Geochemistry*.—Seminar and problems. Given in alternate years. Prerequisites: Geology 573 and 583.

526. (3) *Mineral Deposits*.—Seminar; character, origin, and structure of mineral deposits, with emphasis on ore deposits.

528. (1½) *Exploration Geochemistry*.—Distribution of elements in relation to mineralization; application of geochemical techniques to mineral exploration.

530. (1½) *Advanced X-ray Mineralogy*.—Fundamentals of single crystal x-ray diffraction techniques with emphasis on applications in mineralogy. Prerequisite: Geology 330.

531. (1½) *Advanced Micropaleontology*.—Application of microfossils to biostratigraphy and paleoecoloy; morphology and systematics of various microfossil groups.

534. (1½) *Mechanics of Natural Deformation*.—Lectures and laboratory problems.

536. (1½) *Problems of Stratigraphy*.—Seminar and laboratory. Problems of clastic, nonclastic and volcanic-sedimentary deposition. Stratigraphic paleontology. Emphasis on the stratigraphic associations of the eugeosynclinal or volcanic belts. Given in alternate years.

540. (1) *Advanced Mineralogy*.—Seminars and lectures. Advanced study of the crystal chemistry of minerals.

541. (1½) *Paleobotany*.—Origin and history of plants through geologic time. Paleozoic, Mesozoic and Cenozoic floras. Techniques of collecting, preparation and identification of fossil plants and pollen. The use of fossil plants as indicators of geological age and ecology.

547. (1½) *Advanced Coal Geology*.—The origin and character of coal and associated strata. Petrology, chemistry and physical properties of coal. Sedimentology of peat, biochemical and geochemical stages of coalification and oxidation of coal. Use of organic matter as a geothermometer and in basinal analysis. Structural analysis and character of coal deposits. Analytical methods applied to coal.

549. (3-6) *Master's Thesis*.

552. (1½) *Advanced Geotechnics*.—Advanced topics in engineering geology. Emphasis will be on the physics of geological failures and the mathematical modelling of such failures for the purposes of analysis, prediction and design at engineering sites. Prerequisite: Geology 452.

553. (1) *Advanced Igneous Petrology*.—Seminar.

554. (1½) *Structure and Properties of Crystals and Crystal Aggregates*.—Seminar and laboratory.

558. (3) *Theory of Ore Search*.—Lectures, seminars, and problem sessions in the selection and evaluation of areas of search for economic mineral deposits; appraisal of geological, geophysical, geochemical methods and data; economic considerations. Case histories. Prerequisite: Geology 418. Mineral Engineering 351 (or concurrently).

562. (1½) *Advanced Groundwater Hydrology*.—Finite-difference models of steady-state and transient groundwater flow in the saturated and unsaturated zones; applications to regional groundwater flow, groundwater recharge, subsurface contributions to streamflow, and aquifer evaluation. Prerequisites: Geology 342 and Mathematics 316 or 256.

563. (1) *Advanced Metamorphic Petrology*.—Seminar.

564. (1½) *Transport Processes in Porous Media*.—Transport of mass and heat in groundwater flow systems; modelling techniques including an introduction to the finite-element method; modelling of groundwater contamination. Prerequisites: Geology 342, 442, Mathematics 256 or 316, or permission of instructor.

565. (1½) *Theory of Flow in Porous Media*.—Mathematical principles of groundwater flow; detailed study of the equations of flow in confined and unconfined aquifers. Prerequisites: Geology 342, Mathematics 256 or 316. Given in alternate years.

566. (1) *Topics in Groundwater Hydrology*.—A survey of the principal literature.

573. (2) *Geological Phase Equilibrium*.—Seminar and problems.

583. (2) *Equilibria in Mineral Systems*.—Seminar and problems.

593. (1½) *Laboratory Techniques in Experimental Petrology*.—Instruction and practice in the use of high pressure, high temperature experimental apparatus for phase equilibrium studies of silicates and oxides. Pressures up to 35 kilobars ($4X10^9$ Pa) and temperatures up to 1500°C. Prerequisite: Geology 573 or equivalent thermodynamics, or permission of instructor.

595. (1-3) *Directed Studies in Geology*.—Advanced studies under the direction of a staff member may be arranged in special cases with the approval of the Head of the Department.

599. (3-6) *Thesis*.—For M.A.Sc. degree.

649. *Thesis*—For Ph.D. degree (Science).

699. *Thesis*—For Ph.D. degree (Engineering).

Geophysics (Faculty of Science) For Astronomy courses, see listing under "**Astronomy.**"

120. (1½) *Introduction to Pure and Applied Geophysics*.—The earth as a planet, its evolution and structure. Geophysical measurements in relation to prospecting for mineral and energy resources. Principles of seismology, geomagnetism, geoelectricity and gravity. Discussion of plate tectonics, geochronology, heat flow and solar terrestrial relations. Corequisite: Physics 120, 115 or 110. [2-3*-1; 0-0-0]

221. (3) *Physics of the Earth*.—Electricity, magnetism, thermal physics and properties of matter for students in the earth sciences. Heat flow; thermodynamics; geothermometry; basic field theory; geomagnetism and geoelectricity, elasticity and fluid flow; concepts of radiometric dating of rocks and minerals. Prerequisites: Physics 110, 115 or 120, Mathematics 200 (concurrently). [2-3*-1; 2-3*-1]

310. (3) *Exploring the Universe*.—A discussion of modern topics of Astronomy and Geophysics without the use of advanced mathematics. Topics covered will include: cosmology; galaxies and quasars; stellar evolution; pulsars, "black holes", origin of the solar system and age of the earth, space exploration, the earth's gravity and magnetic fields, seismol-

ogy and earthquakes, continental drift and ice ages. This course is open only to students in third or higher years not registered in the Faculty of Science or Applied Science. No background in science or mathematics is required. Credit will be given for only one of Astronomy 310 and Geophysics 310 as they are identical courses. [3-0; 3-0]

315. (3) *The Solar System.*—A study including theories of their origin and evolution, of the sun, planets, comets, asteroids, meteorites, and the interplanetary medium. Prerequisites: Three units of Physics at the 200 level or above. (Same as Astronomy 315). [3-0; 3-0]

320. (1½) *Introduction to Theoretical Geophysics.*—Tensor calculus; concept of continua, stress and strain, conservation and continuity equations, introduction to linear elasticity with geophysical applications; fluid dynamics, physics of waves. Prerequisites: Mathematics 200, 221. [3-0; 0-0]

321. (1½) *Seismology.*—Reflection and refraction methods for exploration, plane waves in an infinite medium and interaction with boundaries, body wave seismology, inversion of travel-time curves, generalized ray theory, crustal seismology, surface waves, and earthquake source studies. Prerequisite: Geophysics 320. [0-0-0; 3-3*-0]

322. (1½) *Time Series Analysis in Geophysics.*—Continuous and discrete Fourier transforms, correlation and convolution, spectral estimates, optimum least-squares filters, deconvolution and prediction, frequency-wave number filtering. A practical course on computer techniques applied in geophysics. Prerequisites: Computer Science 101 or equivalent, Mathematics 315 (or concurrently). [3-0-1; 0-0-0]

400. (3) *Applied Physics of the Earth.*—Instrumentation, application and limitations of the gravity, magnetic, electrical, electromagnetic and seismic methods in the exploration for mineral and energy resources and in engineering applications. Presentation in the context of the physics of the Earth. (Not for those in Geophysics programs.) [2-2; 2-2]

420. (1½) *Potential Methods.*—The theory and quantitative interpretation of potential field methods in geophysical exploration. Topics include gravity, magnetics, electrical and electromagnetic techniques. Prerequisites: Physics 201 or 311, Mathematics 316 (or Physics 312). [3-0; 0-0]

421. (1½) *Applied Geophysical Laboratory.*—A laboratory course consisting of field surveys, laboratory experiments and interpretation exercises in gravity, magnetics, electrical and electromagnetic methods, radiometric methods, well logging and case history studies. Prerequisite: Geophysics 420. [1*-3-0; 1*-3-0]

422. (1½) *Geophysical Instrumentation.*—Theory and practical experiments in the analysis and calibration of geophysical instruments; seismometers, magnetometers, electromagnetic and other systems. Pre or corequisites: Physics 311 and Mathematics 315. Given in alternate years. [0-0; 2-3]

424. (1½) *Geomagnetism and Space Plasma Physics.*—Fundamentals of plasma dynamics; analysis of the geomagnetic field; dynamo theory; the solar wind and the magnetosphere; whistlers and geomagnetic micropulsations; ionospheric currents and transient geomagnetic variations. Prerequisites: three units of physics at or above the 200 level; three units of mathematics at the 200 level, including Mathematics 200 or equivalent. [0-0; 3-0]

425. (1½) *Geophysics Seminar.*—A lecture and student seminar course in which the subdisciplines within geophysics are correlated and discussed in the light of recent geophysical theories of the earth and planets. Prerequisite: Enrolment in Fourth or higher year of a Geophysics program. [0-0; 3-0]

426. (1½) *Advanced Physics of the Earth.*—Quantitive methods for determining the physical properties and structure of the earth. Basic inversion interpretation techniques for gravity, magnetic, seismic, paleomagnetic, radiometric methods. Thermal history and the evolution of the earth. Pre or corequisites: Mathematics 315 and Physics 312 (or Mathematics 316). [0-0-0; 3-0-0]

428. (1½) *Advanced Geophysical Data Analysis.*—Inverse theory, model construction and appraisal in linear problems. Conventional and high resolution techniques in power spectrum analysis. Practical applications will be drawn from many areas of geophysics, in particular, the processing of reflection seismograms. Prerequisite: Geophysics 322. [3-0-1; 0-0-0]

448. (1-3)**c** *Directed Studies.*—A course designed to permit students to undertake an investigation of a topic to be agreed upon by a member of the faculty and the student. Permission of the Head of the Department and the supervising faculty member is required.

449. (3) *Thesis.*—This course is available only to students enrolled in Honours Geophysics programs.

499. (3) *Thesis for B.A.Sc. degree.*—Topic to be approved by the Department. [0-3-0; 0-3-0]

502. (2) *Principles of Earth Science.*—A detailed discussion of geologic evidence bearing on graduate research in the Geophysics Department.

511. (1-2)**c** *Seismology.*—Theory of seismic waves and the calculation of synthetic seismograms; interpretation of body and surface waves, free oscillations; seismicity, source studies, prediction; instrumentation; exploration applications.

512. (1-2)**c** *Geomagnetism and Aeronomy.*—Description of the geomagnetic field, dynamo theory of the origin of the geomagnetic field; transient magnetic variations; magnetic storms and ionospheric disturbances.

514. (1-2)**c** *Geophysical Analysis.*—Lectures and seminars on applications of statistical communication theory to analysis of geophysical data; time series analysis, optimum linear systems, and decision theory.

516. (1-2)**c** *Theoretical Glaciology.*—Lectures and seminars on theoretical aspects of glacier mechanics; flow, stress and temperature fields, sliding theory, flow instabilities.

517. (1-2)**c** *Geophysical Inverse Theory.*—Model construction and appraisal in linear and non-linear problems; the methods of Backus and Gilbert, funnel theory and global bound solutions, construction of parametric models, Gel'-fand-Levitan solutions, uses of linear and quadratic programming.

520. (1-3)**c** *Directed Studies in Geophysics.*

521. (1-3)**c** *Studies in Applied Geophysics.*

523. (1-3)**c** *Studies in Geophysical Analysis.*

524. (1-3)**c** *Studies in Glaciology.*

527. (1-3)**c** *Studies in Seismology.*

549. (6) *M.Sc. Thesis.*

599. (6) *M.A.Sc. Thesis.*

649. *Ph.D. Thesis.*

Germanic Studies (Faculty of Arts)

German

100. (3) *Beginners' German.*—Introduction to the language. (See also German 123 and 430.) [3-1; 3-1]

110. (3) *First-Year German.*—Review of grammar; extensive reading. Prerequisite: German 11. [4-0; 4-0]

120. (3) *First-Year German — Special Section.* —Grammar, composition, extensive reading. Prerequisite: German 12 or First Class in German 11. [4-0; 4-0]

123. (6) *German Language.*—Accelerated course.—Grammar, composition, reading and oral work. This course is equivalent to German 100 and 200. [5-2; 5-2]

200. (3) *Second-Year German.*—Reading, grammar, composition. Prerequisite: German 100. [4-0; 4-0]

223. (3) *Intermediate Oral Practice and Composition.*—Prerequisite: German 200 or 210 or First Class in German 120. [3-0; 3-0]

233. (3) *Intermediate Oral Practice and Composition.*—Accelerated Course Part I. — This course equivalent to German 223 is offered in the first term and is usually taken in combination with German 333. [6-0; 6-0]

300. (3) *Third-year German.*—Intermediate Grammar, Reading, Composition, Conversation. [3-0; 3-0]

310. (3) *German Literature from the Post-Romantic Period to the Present.*—Major literary trends and representative figures. [3-0; 3-0]

323. (3) *Advanced Oral Practice and Composition.*—Intensive training in oral expression and free composition. [3-0; 3-0]

333. (3) *Advanced Oral Practice and Composition.*—Accelerated Course Part II. — This course is equivalent to German 323 and is usually taken in combination with German 233. [0-0; 6-0]

339. (3) *Third Year Honours Tutorial.* [0-2; 0-2]

350. (3) *From the Enlightenment to the Romantics.*—Representative works with emphasis on Lessing, Goethe and Schiller and the major Romantic writers. [3-0; 3-0]

400. (3) *Fourth-year German.*—Advanced Grammar, Reading, Composition, Conversation. [3-0; 3-0]

402. (1½/3)**d** *Currents of Thought in Eighteenth-Century Literature.* [3-0]

403. (1½/3)**d** *Studies in the Classical Period.* [3-0]

404. (1½/3)**d** *The Romantic Movement.*—A study of the literature of the period against the background of philosophical, political and social developments. [3-0]

405. (1½/3)**d** *Prose Works of the Nineteenth Century.*—A study of German prose literature in the period of emerging realism: such authors as Büchner, Gutzkow, Ludwig, Keller, Stifter, Raabe, Freytag, Meyer, Storm and Fontane. [3-0]

406. (1½/3)**d** *Studies in Nineteenth-Century Drama.*—Intensive study and critical interpretation of major dramatists. [3-0]

407. (1½/3)**d** *German Poetry from Goethe to Nietzsche.*—The work of representative poets against the background of changing literary values. [3-0]

408. (1½/3)**d** *The Novel in the Twentieth Century.* [3-0] or [3-0; 3-0]

409. (1½/3)**d** *Twentieth-Century Drama.*—Critical interpretation of representative dramas from Naturalism to the present. [3-0] or [3-0; 3-0]

410. (1½/3)**d** *Twentieth-Century Poetry.*—The lyric of the twentieth century with special emphasis on interpretation. [3-0]

423. (3) *Advanced Translation and Composition.*—Intensive study of linguistic and stylistic structures in modern German and extensive practice in the translation of German literary materials and in free composition in German. May be taken in combination with German 323. [3-0; 3-0]

430. (3) *German for Reading Knowledge.*—This course aims to develop a reading knowledge of German, sufficient to enable students to understand scientific and scholarly material. It provides basic grammar and practice in the translation of texts in the natural sciences, the social sciences and the humanities into English. Not for credit towards a Major or Honours program in German. [3-0; 3-0]

439. (3) *Fourth Year Honours Seminar.* [0-2; 0-2]

449. (3) *Honours Essay.* [0-2; 0-2]

450. (3) *Survey of German Literature to 1700.* [3-0; 3-0]

500. (1½/3)**d** *Research Methods.*

501. (1½/3)**d** *Critical Approaches to Literature.*

502. (1½/3)**d** *History of the German Language.*

503. (1½/3)**d** *Introduction to Middle High German.*

504. (0) *Seminar on German Composition and Oral Expression.*

511. (1½/3)**d** *Studies in Medieval Literature.*

512. (1½/3)**d** *Studies in Renaissance Literature.*

513. (1½/3)**d** *Studies in Baroque Literature.*

514. (1½/3)**d** *Studies in the Literature of the 18th Century.*
515. (1½/3)**d** *Studies in the Classical Period.*
516. (1½/3)**d** *Studies in Romanticism.*
517. (1½/3)**d** *Studies in the Literature of the 19th Century.*
518. (1½/3)**d** *Studies in Expressionism.*
519. (1½/3)**d** *Studies in the Literature of the Early 20th Century.*
520. (1½/3)**d** *Studies in Literature after 1945.*
531. (1½/3)**d** *Special Topics.*
532. (1½/3)**d** *Genre Studies.*
533. (1½/3)**d** *Studies in Individual Authors.*
534. (1½/3)**d** *Studies in Austrian Literature.*
548. (1½/3)**c** *Guided Research.*
549. (3) *Master's Thesis.*
649. *Ph.D. Thesis.*

Germanic Studies

201. (3) *German Literature in Translation: Great Works.*—A study of selected works from the medieval period to the twentieth century, as seen within the general development of German literature. Lectures on literary movements and reading and class discussion of individual texts. [3-0; 3-0]
301. (3) *History of German Civilization.*—Development of German culture from its beginnings to the nineteenth century. Lectures and discussions. [3-0; 3-0]
302. (3) *Elementary Swedish.*—Introduction to the language. [3-0; 3-0]
303. (3) *German Literature in Translation: Twentieth Century.*—Reading and discussion of selected works as seen against the background of literary, social, and political developments in twentieth-century Germany. [3-0; 3-0]
401. (3) *German Literature in Translation: Special Studies.*—A study of selected topics, variable from year to year, concentrating on questions of theme or genre, or on the work of selected individual authors rather than general literary developments. [3-0; 3-0]
411. (3) *Introduction to Scandinavian Literature.*—An outline of the general scope of the literature of Sweden, Norway and Denmark in modern times with emphasis on the reading of works (in English translation) by Strindberg, Ibsen, and Hamsun and their influence on European and American literature. [3-0; 3-0]
412. (3) *Intermediate Swedish.*—Advanced grammar, reading practice, and oral work. Prerequisite: Germanic Studies 302. [3-0; 3-0]
510. (1½/3)**c** *Old Icelandic.* (Though 510 is usually taught as a three-unit course, students may elect to take the first term only, "Introduction to Old Icelandic" for 1.5 units.)

Greek (Department of Classics, Faculty of Arts)

100. (3) *Beginners' Greek.*—An introduction to the fundamentals of reading and writing classical Greek. (Credit cannot be obtained for both Greek 100 and Greek 125.) [4-0; 4-0]
125. (3) *Introduction to New Testament Greek.*—Designed primarily for students specializing in Religious Studies. [4-0; 4-0]
200. (3) *Introduction to Greek Prose and Verse.*—Prerequisite: Greek 100. [4-0; 4-0]
301. (3) *Greek Literature of the Classical Period.*—Composition, Plato's *Apology,* and a tragedy. Prerequisite: Greek 200. [3-0; 3-0]
402. (3) *Greek Drama.*—Development of Greek drama studied through representative plays from the tragedians and Aristophanes. Prerequisite or co-requisite: Greek 301. [3-0; 3-0]
405. (3) *Greek Epic, Lyric and Elegiac Poetry.*—Selections from Homer's *Iliad* and/or *Odyssey;* selections from lyric and elegiac poets. Prerequisite or co-requisite: Greek 301. [3-0; 3-0]
407. (3) *Greek Philosophy and Oratory.*—Selections from Plato and/or Aristotle and oratorical works. Prerequisite or co-requisite: Greek 301. [3-0; 3-0]
408. (3) *Greek History.*—Selections from Xenophon, Herodotus and Thucydides. Prerequisite or co-requisite: Greek 301. [3-0; 3-0]
410. (3) *Advanced Composition.*—Obligatory for Honours students in the Third or Fourth Year. [2-0; 2-0]
521. (1½/3)**c** *Studies in Greek Literature.*
525. (1½/3)**d** *Seminar in Greek Literature.*
530. (1½/3)**d** *Seminar in Greek Archaeology.*
535. (1½/3)**d** *Seminar in Greek History.*
540. (1½/3)**d** *Seminar in Greek Palaeography.*
545. (1½/3)**d** *Seminar in Greek Epigraphy.*
549. (3/6)**c** *Master's Thesis.*
550. (1½/3)**c** *Directed Studies.*
649. *Ph.D. Thesis.*

Health Care and Epidemiology (Faculty of Medicine)

400. (1½) *Statistics for Health Research.*—Planned collection, numeric and graphic summarization, and elementary statistical analysis of data. Examples primarily from health sciences illustrate standard techniques for parametric and non-parametric hypothesis testing; regression and correlation; contingency tables. Also randomization, "blindfolding" and other specifically biomedical topics in statistics. Prerequisite: ability to use high school algebra and simple graphs. Attendance requires permission of the instructor and class size may be limited. [3-0; 0-0]
402. (1½) *Introduction to Clinical Practice.*—An introductory course for those students whose professional training is not in any of the health professions. (Not offered 1986/87.)
403. (1) *Industrial Hazards to Humans.*—The clinical effects of various industrial hazards; preventive and treatment mechanisms applicable to industrial disease. Primarily for senior undergraduate students in Applied Science, particularly engineers. Permission of instructor required. [2-0; 0-0]
404. (1½) *Introduction to Health Service Institutions and their Operation.*—An examination of the operational activities of a spectrum of health institutions, to include board and management areas. Prerequisite: HCEP 400. (Not offered 1986/87.)
410. (2/3)**c** *Current Administrative Issues in Health Care.*—Current problems, procedures and policies in the field of health care. Prerequisite: Commerce 323. [4-0; 0-0] or [6-0; 0-0]
450. *Preventive Medicine.*—The principles and application of epidemiology to the prevention, control and measurement of acute and chronic disease; occupational health and industrial medicine. (For Second year medical students only.)
451. (1½) *Epidemiology in the Practice of Medicine.*—An introductory course emphasizing the uses of epidemiologic concepts and techniques in clinical investigation and community medicine. This course has been designed as a basic science elective for third year medical students. (Not offered 1986/87.)
452. *Health Care.*—Social medicine, including the community approach to health care and environmental medicine and the principles of medical care for Third-Year medical students.
454. (1½) *Systems and Computer Applications in Medicine.*—An introductory course emphasizing the uses and potential value of both the systems approach and computers in medical science and practice. This course is a basic science elective for third year medical students.
455. (1½) *Introduction to Biomedical Engineering Technology.*—An introductory lecture course introducing important technological aspects of health care including instrumentation concepts, physiological signals, systems concepts, prosthetics and life-support systems. This course has been designed as a basic science elective for third year medical students.
475. (1½/3)**c** *Health Care.*—Social medicine, including the community approach to health care and environmental medicine and the principles of medical care.
500. (1½) *Canadian Health Services.*—A seminar on issues and problems in the delivery of health care in Canada.
501. (1½/3)**c** *Health Care in the Context of Canadian Social Policies.*—1. An analytical study of social policy and Canadian health policy making. 2. Projects based on the learning in Part I. Analysis of health policy making by Federal Government and the Provinces; social policies; interest group activities in policy making in Canada.
502. (1½) *Measurement of the Health of Human Populations.*—Sources and uses of epidemiologic data for health services planning and administration including methods of data collection and study design. Permission of the instructor must be obtained before registration except for students in Health Care and Epidemiology graduate degree programs.
504. (1½) *Clinical Epidemiology.*—Principles and methods of epidemiology are applied to clinical problems. Evaluation and design of laboratory and clinical tests and of therapeutic interventions. Prerequisites: HCEP 400 and 502 or equivalent.
507. (1½) *Industrial Toxicology I.*—Mechanism of action of commonly encountered occupational toxic agents; relevance of laboratory and epidemiological evidence. Prerequisite: M.D. or permission of Department Head.
508. (1½) *Industrial Toxicology II.*—Effects of individual toxic agents on complete organ system; problems of specific industries. Prerequisite: HCEP 507.
510. (3) *Clinical Occupational Health.*—Emphasis on the occupational and environmental etiology of disease.
516. (1½) *Planning for Health Services*—A critical analysis of planning activities in health service institutions. The course is organized around case studies of program planning.
517. (1½/3)**c** *Health Planning Project.*—Implementation of planning theory through the completion of a bounded project within a health agency, and under individual faculty supervision. Prerequisite HCEP 516.
518. (1½) *Systems Modelling in Health Care.*—A study of health care using the mathematical modelling techniques of systems analysis and computer simulation. Modelling ranges from micro models such as an emergency ward to macro models such as a provincial health care system. Techniques vary from stochastic modelling of individual encounters to deterministic "flows" of health care. Introduction to relevant systems and control theory topics.
520. (1½/3)**c** *Social Research Methods in Health Care.*—A course by lecture and seminar which examines the range of social research methodologies and strategies appropriate for an analysis of health service systems and problems. Emphasis is given to research design. Prerequisite: HCEP 400.
521. (1½) *Application of Social Research Methods in Health Care.*—A course by seminar and demonstration which encourages students to apply social research methods to assist problem solving within the planning context in health services. Prerequisite: HCEP 520.
526. (1½) *Selected Topics in Epidemiology.*—By seminars and directed readings, certain topics of current interest are explored in depth. The choice of topics will be decided by students and instructor, with relevance to thesis preparation where appropriate. Enrollment by permission of instructor; Previous work in epidemiology and statistics is required.
530. (1½) *The Delivery of Community Health Services.*—Presentation by lecture and seminar of the various aspects of community health practice including problem assessment and decision making. Permission of instructor is required.

531. (1½) *Advanced Topics in Community Health Practice.*—A series of seminars dealing with specialized areas of community health practice. This will include an in-depth look at the rationale strategies, organization and evaluation of programs in the areas of life style, community dentistry, occupational and environmental health. Prerequisite: HCEP 530.

532. (1½) *Seminar on Rehabilitation.*—Philosophy and policies of care in rehabilitation medicine in hospital and community settings. Changing patterns of habilitation and rehabilitation. Pre-vocational rehabilitation assessment. Home care and community membership. Professional relationship of team members. Co-ordination of team work.

533. (1½) *The Delivery of Primary Health Care.*—Examination and assessment of Primary Health Care schemes. Methods of financing personal health care. Use of health professionals.

534. (1½) *Professionalization and the Health Professions.*—A study of historical development of the professions, professionalism and the semi-professions, licensing and dilution policies. Status problems. Professional positions, roles and norms. Role stress, personal and organizational. Specialization, bureaucratization. Professional identity and the need for change. Socialization into the professions; learning, ethics, association. Attrition and adaptation. (Not offered 1986/87.)

535. (1½) *Socio-Economic Factors and International Health Developments.*—Defining poverty and health (including mental health). Measurements absolute and relative. World distribution of resources. Special problems of developing and developed countries. Canadian problems of poverty and health. Methods of financing health services, problems of distribution. Health professionals and semi-professionals. Communication problems.

536. (1½) *Health Services Research: Evaluative Research.*—Examines the concept of evaluation in health services and how various methodological approaches can be used in evaluative studies.

537. (1½) *Health Law.*—Legal environment of health care including current legal issues encountered in health services administration, planning and policy.

538. (1½/3)c *Directed Studies.*

539. (1½) *Health Services Research II: Economic Evaluation.*—Economic evaluation of health service interventions and programs, with emphasis on methods and components of program costing. Prerequisites: ECON 384 and HCEP 536.

540. (1½) *Clerkship.*—An attachment of three months to an approved preceptor in the field of health planning/administration. Prerequisites: completion of one year of full-time study (or equivalent) in the Health Services Planning and Administration Program.

549. (6) *M.Sc. Thesis.*

(Postgraduate Residency Training Program).

710. *Introduction to Community Medicine Practice.*—An introductory survey to Community Medicine.

711. *Field Experience.*—A series of visits to facilities and organizations related to Community Medicine Practice. Directed by Faculty. At least four hours per month.

712. *Supervised Work.*—A weekly review by Faculty of the work carried out by the resident with discussion on the objectives, planning, method of operation and outcome. Two hours per week.

713. *Community Health Tutorials.*—Topics of Public Health interest presented throughout the year by Faculty and guest lecturers. Two hours per month.

714. *Community Medicine Seminars.*—Selected topics of current interest in Community Medicine Practice or in its basic sciences. Presented by residents and discussed with Faculty and invited guests. Three hours per month.

715. *Journal Seminars.*—A monthly two-hour seminar on selected journal articles of Community Medicine interest are presented by the residents and discussed with Faculty and invited guests.

716. *Research in Community Medicine or its basic sciences by a resident.*—Up to two days per week. Supervised by Faculty.

717. *Introduction to Occupational Medicine Practice.*—An introductory survey to Occupational Medicine practice.

718. *Fundamentals of Clinical Epidemiology.*—Seminar series covering critical appraisal of the medical literature and basic research methods for residents in any post-graduate training program.

Health Sciences

The Health Sciences Centre of the University of British Columbia provides a common learning environment for students of the Health Sciences and Professions.

A Co-ordinating Committee is in charge of the planning of the physical and administrative structure of the Health Sciences Centre.

A number of accredited and experimental programs (courses, projects, summer work opportunities, conferences and seminars) are available from the Health Sciences Faculties and Schools to students of the Health Professions on an elective basis and at the discretion of the Departments, Schools and Faculties concerned.

The following Departments, Schools and Faculties offer such courses, as described within their respective listing of courses in this Calendar:

School of Audiology and Speech Sciences:
Refer to Calendar entry for the School

Faculty of Dentistry:
Department of Oral Biology
Department of Oral Medicine
Department of Orthodontics

School of Family and Nutritional Sciences:
Courses in Foods, Nutrition, Family and Human Development

Faculty of Medicine:
A number of courses in several departments of the Faculty of Medicine are available to students as electives on the basis stated above. Descriptions of these courses may be found in the departmental listings of the Faculty of Medicine.

School of Nursing:
Courses in Nursing Administration, Curriculum, Nursing Research, and in Epidemiology

Faculty of Pharmaceutical Sciences:
Courses in Pharmacology, Pharmaceutical Chemistry, Toxicology, Pharmaceutical Law and Community Health

Department of Psychology:
Psychology 300—Behaviour Disorders
Psychology 301—Developmental Psychology
Psychology 304—Brain and Behaviour
Psychology 321—Environmental Psychology
Psychology 401—Clinical Psychology
Psychology 420—Community Psychology

School of Rehabilitation Medicine:
Refer to the Calendar entry for the School

School of Social Work:
Social Work 300—Canadian Social Services I
Social Work 335—Human Behaviour and Social Environment
Social Work 430—Special Studies in Social Work (elective courses on issues relating, for example, to children, the aged and minorities)
Social Work 513—Social Welfare Problems: Socio-Economic Needs
Social Work 522—Social Policy and Program Planning in the Health Field
Social Work 523—Socio Economic Policy and Program Planning
Social Work 530—Social Policy and Program Planning and Administration
Social Work 570—Directed Studies in Social Work (see Social Work 430 above)

Hebrew (Department of Religious Studies, Faculty of Arts)

305. (3) *Elementary Hebrew (Biblical).*—Elements of grammar and translation of prose and poetry. Open to first and second year students with permission of instructor. [3-0; 3-0]

405. (3) *Intermediate Hebrew (Biblical).*—Second year of Biblical Hebrew with emphasis on rapid reading of poetry and prose. Prerequisite: Hebrew 305. [3-0; 3-0]

479. (1½-6)c *Supervised Study in Biblical Hebrew.*—Prerequisite: Hebrew 405.

Higher Education (Faculty of Education)

493. (1½) *Introduction to the Study of Higher Education.*—An introduction to the field of higher education in Canada and to British Columbia in particular. Topics to be studied will include the objectives of higher education, its historical development and current issues such as diversity of offerings, enrolment, accessibility, finance, and governance of these institutions. [3-0; 0-0] or [0-0; 3-0]

510. (1½) *Foundations for the Study of Higher Education.*—The historical, philosophical and socio-cultural factors which form the bases for the development of various institutions of post-secondary education in Canada.

511. (1½) *Organization and Administration of Higher Education I.*—Organization theory applied to universities and colleges.

512. (1½) *Program Planning in Higher Education.*—Theoretical, conceptual and philosophical issues related to planning programs in institutions of Higher Education. Various models of decision-making and factors which influence their theoretical and practical utility in different institutional contexts.

513. (1½) *Current Issues in Higher Education.*—Selected problems in the administration of various post secondary educational institutions. Prerequisites or corequisites: HIED 510, 511, 512.

521. (1½) *Organization and Administration of Higher Education II.*—Organization theory applied to the administration of universities and colleges. Development of topics beyond those of HIED 511. Prerequisite: HIED 511.

522. (1½) *Human Resources in Higher Education.*—Policies and practices of developing and maintaining an effective faculty and staff in universities and colleges.

530. (1½) *Community Service Function of the Community College.*—The community college as a resource for the economic, social, cultural, and political development of the communities which they serve. The historical and philosophical roots of the community service orientation and means used to promote community development.

540. (1½) *The Community College Concept.*—A study of the history, philosophy, and development of the community college idea in Canada, with particular reference to British Columbia.

541. (1½) *Community College and Institute Programs.*—The theoretical bases for program development in colleges and institutes with particular reference to academic, technological and vocational programs.

561. (1½-6)c *Laboratory Practicum.*

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565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

Hindi—See Asian Studies: Indic Languages.

Hispanic and Italian Studies—See Italian, Italian Studies, Romance Studies, Spanish and Portuguese.

History (Faculty of Arts)

101. (3) *Western European History from the Fall of Rome to the Reformation.*—The evolution of medieval Europe emphasizing structures and their changes: the ordering of society, the economy, beliefs and ideas, the organization of communities and their political development. [3-0; 3-0]

115. (3) *Introduction to History and Philosophy of Science.*—An interdisciplinary introduction to the nature of science and technology; their place in modern culture. Will focus on several issues, their historical development and philosophical significance. The issues will vary from year to year. (Same as Philosophy 115). [2-1; 2-1]

120. (3) *European History from the Renaissance to the Present.*—A survey of continuity and change in the economic and social foundations, and in the political, administrative and military spheres, as well as some of the accompanying scientific, philosophical, literary, artistic, architectural and other cultural achievements and styles of European civilization. [2-1; 2-1]

122. (3) *Introduction to Modern European History.*—The civilization of Europe between the late Middle Ages and the First World War. No attempt will be made to narrate or otherwise capture the complete story. Different issues, limited in time, place or scope, yet characteristic and revealing of the whole, will be taken up in different years. (See the History Department for details.) [3-0; 3-0]

125. (3) *Main Currents in Twentieth-Century History.*—Imperialism, the road to World War I, the uncertain peace, fascism, Nazism, appeasement, the Second World War, communism in the U.S.S.R. and China, the Cold War, the Third World, the welfare state. [2-1; 2-1]

135. (3) *The History of Canada.*—Some of the principal events in Canadian history and the various interpretations of them. [2-1; 2-1]

170. (3) *Introduction to South Asia.*—Geographical, cultural, and historical backgrounds to India, Pakistan, and Bangladesh. Problems of political, economic, and social development since 1947. (Same as Asian Studies 115.) [3-0; 3-0]

171. (3) *Introduction to East Asia.*—Geographical, ethnic and historical backgrounds of China, Japan and Korea. Survey of twentieth-century East Asian history. (Same as Asian Studies 105.) [3-0; 3-0]

201. (3) *The Colonial Experience in the Americas.*—A comparative study of the interaction between Amerindian and European and African cultures within the colonial empires in the Americas, from the sixteenth to the twentieth centuries. [2-1; 2-1]

202. (3) *Modernization in Historical Perspective.*—Explores the transition from pre-industrial to modern society in western Europe from 1700 to the present, with some examination of the impact of this process on Asia, Africa and Latin America in the nineteenth and twentieth centuries. [2-1; 2-1]

203. (3) *Major Topics in British History.*—British Constitutional History. Development of the principal constitutional institutions of England and Great Britain from Anglo-Saxon beginnings to contemporary times, with special reference to the influence of that development on Canadian institutions. [2-1; 2-1]

205. (1½) *Introduction to Historical Archaeology.*—An introduction to the study of medieval and modern material culture, with special emphasis on Canada, using archaeological evidence to illustrate the principles, aims and techniques of historical archaeology and related disciplines. (Same as Anthropology 205.) [3-0]

207. (1½) *Piety and Dissent in the High Middle Ages.*—Formation, successes, failures of and reactions to rural and urban religious institutions from the 12th to the 14th centuries. [2-1]

208. (1½) *Medieval Trade and Towns.*—Business methods and institutions developed during the high middle ages, with emphasis on urbanization, especially in Italy and the Mediterranean basin. [2-1]

237. (3) *Major issues in American History.*—A general course, from the colonial period to the modern, examining the political system, slavery and the Civil War, manifest destiny and the frontier, urban and industrial American foreign policy in the twentieth century. [2-1; 2-1]

270. (3) *Modern China and the West.*—The invasion of China since the 1600's by western civilization; the impact of Chinese culture and of the modern Chinese revolution on the west, Canadian relations with China included. Open to students with no previous knowledge of China. (Same as Asian Studies 270.) [2-1; 2-1]

271. (1½) *Japan and the West since 1600.*—A thematic study of Japan's international relations from the early modern period to the present within the changing balance of world power. Focus on the characteristics of great-power status within a Japanese context and how they have differed from those of China and the West. [2-1]

273. (1½) *Korea in the Modern World.*—History of the Korean people in the 20th century; the traditional cultural heritage; Japanese colonial rule; the Korean war; the two Korean states. Emphasis on modernization. [2-1]

302. (3) *History of the Native Peoples of Canada.*—The native people (status and non-status) of Canada from contact to the present. Topics include native involvement in the fur trade and later economic developments, the emergence of the Metis, the treaty-making process, and the evolution of government policies for native peoples. [3-0; 3-0]

303. (3) *History of the Canadian West.*—Selected topics in the history of the Canadian West with an emphasis on the prairie west; the Indian and the fur trade, Louis Riel, prairie settlement and western social and political protest. [2-1; 2-1]

305. (3) *The Expansion of Europe.*—An introduction to the study of the impact of Europe on the traditional societies of Asia, Africa and Latin America. Imperialism, social change, resistance to the European dominance and the emergence of modern nationalism will be studied through selected case studies. [3-0; 3-0]

306. (3) *History of France, 1461-1715.*—The development of absolute monarchy in France, with emphasis upon: change and conflict in French society; spiritual and intellectual "crisis"; the place of France in the emerging European state system; and opposition to the monarchy. [3-0; 3-0]

307. (3) *French Canada in the 17th and 18th Centuries.*—Quebec and Acadian society before 1800. [3-0; 3-0]

309. (3) *Far Eastern Diplomatic History, 1800-1950.*—(Same as Asian Studies 309.) [3-0; 3-0]

310. (3) *British Imperial History.*—Rationales and criticisms of empire; economic systems; new societies and nationalist movements; representative individual empire builders. Covers late fifteenth century to the present with emphasis upon the nineteenth and twentieth centuries. [3-0; 3-0]

313. (3) *The Renaissance.*—The interplay between new and traditional ideas, styles and institutions from the fourteenth to the mid-sixteenth centuries, primarily in Italy, with emphasis upon the relationship of social, economic and political factors to intellectual and cultural change. [3-0; 3-0]

314. (3) *History of West Africa and Southern Africa.*—Pre-colonial, colonial and contemporary African history, stressing Nigeria and Ghana in the first term and South Africa in the second. [3-0; 3-0]

315. (3) *History of the Natural Sciences in Modern Times.*—Scientific thought examined not only as achieved knowledge about "the nature of things" but also as a "cultural artifact" emerging from specific social, political, and economic circumstances. The course focuses on the Scientific Revolution (1450-1700) and its consequences in modern thought. [2-1; 2-1]

316. (3) *European Social History.*—A study of the changes in economic activity, social structure, family life, religious attitudes and popular behaviour which accompanied the transformation of Europe from a pre-industrial to an industrial society. [3-0; 3-0]

318. (3) *England Under the Tudors and Stuarts, 1485-1688.*—A study of the political, religious and social changes in England with emphasis on the period from the Reformation to the English Revolution. [3-0; 3-0]

319. (3) *History of Poland, 1505-1921.* [3-0; 3-0]

321. (6) *Honours Tutorial.* [0-2; 0-2]

322. (6) *Honours Tutorial.* [0-2; 0-2]

324. (3) *History of East Central Europe in the 19th and 20th Centuries.*—Covers the region between Germany and Russia as well as Southeast Europe. Emphasis on comparisons with Western Europe and features that make the area significant to Europe as a whole. [3-0; 3-0]

325. (3) *German-Slav Relations from the Ninth-Century to 1945.*—Germans and Slavs in the Habsburg Monarchy; the role of Germany and Prussia in Eastern Europe; Hitler, the Third Reich and the Slavs. [3-0; 3-0]

326. (3) *British North America, 1763-1867.*—A survey of the history of the various regions of British North America that were to form the Dominion of Canada, namely Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, Lower Canada and Upper Canada, Rupertsland, British Columbia and Vancouver Island. Included will be political, social and economic aspects of the life of the peoples inhabiting these areas, their relationship to Great Britain and to their southern neighbours. [3-0; 3-0]

327. (3) *American Colonial and Revolutionary History.*—A study of the social, economic and political characteristics of the thirteen colonies as they changed from European outposts to more mature societies, and of the revolutionary movement which led to the formation of the United States. [3-0; 3-0]

328. (3) *The United States, 1789-1877.*—Political and social development in the new American nation, with special emphasis on the Constitution in practice, expansion, regionalism, Jacksonian democracy, social reform, the Civil War and Reconstruction. [3-0; 3-0]

329. (3) *The Social Development of Canada.*—A study of selected topics in the history of Candian society, including frontier settlement, rural life, religion, social and institutional structures, immigration and ethnicity, social movements, ideology, family life and life cycle, demographic change, labour industrialization, and urbanization. [3-0; 3-0]

331. (3) *Political History of Early Modern Europe (1450-1815).*—A study of the internal development of the European states, of the relations and conflicts between them, and of their expansion into the world. [3-0; 3-0]

333. (3) *Third-Year Honours Seminar.* [0-2; 0-2]

334. (3) *Europe in the 19th Century.*—An investigation of main themes in European history from the French Revolution to the beginnings of the 20th century. Topics of particular importance are: domestic politics; the interaction of states; the formation of new states; social and economic transformations affecting the whole civilization; major cultural expressions of the century. [3-0; 3-0]

338. (3) *The United States in the 20th Century.*—American history from the First World War to the 1970's. While foreign affairs are treated in some depth, the course focuses primarily on the domestic scene. Economic developments, the current of ideas, social and political change receive special attention. [3-0; 3-0]

350. (3) *Latin American History.*—A survey designed to show, by discussion of the key issues of the last 2,000 years, how the modern society and culture of Latin America came into being. Usually offered alternatively with History 450. [3-0; 3-0]

351. (3) *History of Spain and Portugal.*—Aspects of the growth of the Peninsular Societies and the expansion of Hispanic civilization in Europe and the New World. [3-0; 3-0]

370. (3) *Social History of Medieval Europe.*—A general survey of social organization and the development of public and private institutions. [2-1; 2-1]

371. (3) *Economic History of Europe to 1750.*—Major fluctuations in the European economy, beginning with the decline of the Roman economy. [3-0; 3-0]

372. (3) *Ideas and Institutions of the Middle Ages.*—Studies in Medieval and political ideas and the institutions of government and law. [3-0; 3-0]

373. (3) *Medieval English Institutions.*—Particular attention will be paid to constitutional problems, the development of parliament and offices of state. [3-0; 3-0]

374. (3) *France in the Middle Ages.*—Selected problems in the development of France as a territorial and political unit, from the Germanic invasions to the fifteenth century. [3-0; 3-0]

375. (3) *Russia from the Ninth Century to 1689.* [3-0; 3-0]

380. (3) *Modern Chinese History Since 1840.*—An analysis of changes in institutions and ideas in China from the late Imperial Period to the most recent developments of the Chinese Revolution. Approaches are thematic, by periods, and by problems. (Same as Asian Studies 380.) [3-0; 3-0]

381. (3) *The Civilization of Late Imperial China.*—Evolution of Chinese civilization from ca. 1000 to 1600. The many-sided cultural and political legacy of the Sung period; the impact of the period of Mongol domination; the Ming period. Cultures of peoples who ruled part or all of China will be touched upon. Not offered every year. (Same as Asian Studies 321.) [3-0; 3-0]

382. (3) *History of Chinese Civilization.*—A survey of Chinese history from ancient times to 1840, with emphasis on the period up to A.D. 1000. (Same as Asian Studies 320.) [3-0; 3-0]

383. (3) *History of Japanese Civilization.*—Japanese political, social and cultural history from earliest times to 1868. (Same as Asian Studies 330.) [3-0; 3-0]

384. (3) *History of Indian Civilization.*—Political and cultural history from the earliest times to the Medieval period. (Same as Asian Studies 340.) [3-0; 3-0]

385. (3) *History of India since 1800.*—Developments in Indian society and culture under the British Raj, the origins and growth of the freedom struggle, the emergence of independent states in the sub-continent, and problems of nation-building and modernization since 1947. (Same as Asian Studies 385.) [2-1; 2-1]

387. (1½) *Medieval India.*—The history, culture and social and economic organization of South Asia from the decline of the classical Hindu empires through the Sultanate Period. [2-1]

388. (1½) *Mughal India.*—History of the politics, economy, society and culture of South Asia from the Great Mughals to the British conquest. [2-1]

400. (3) *Intellectual History of Modern Europe.*—Concentrates on selected problems in the history of European social, political and general philosophical thinking from the seventeenth century. The course emphasizes the careful reading of primary texts. [3-0; 3-0]

401. (3) *French Canada from the End of the 18th Century to the Present.*—Examines the relations between the English and the Canadians prior to the Rebellions of 1837-38, the emergence of the "state of siege" mentality after 1840, the impact of industrialization in Quebec, the Quiet Revolution and independence movement. [3-0; 3-0]

402. (1½) *Problems in International Relations: Diplomacy and the Origins of Wars.*—A study of the relationship of the diplomatic factor to other factors in the origins of the First and Second World Wars. (This seminar is open only to 4th Year students in the Majors Program in International Relations.) [0-2]

403. (1½) *Seminar in the History of International Relations.*—Selected topics such as the role of diplomacy and its relation to other factors in international affairs, Canadian external relations, third-world international politics, Cold-War historiography, and area studies. (Open only to fourth-year students in the major program in International Relations.) [0-2]

404. (3) *British Columbia.*—Selected themes in the history of the region, primarily during the post-confederation years. Topics will emphasize changes in the economic, social and institutional structures of the province. [2-1; 2-1]

405. (3) *History of Imperial Russia, 1689-1917.*—Concentrating on the period from Peter the Great to the 1917 Revolution, this course emphasizes domestic developments, particularly the modernization of Russia and the social crisis and revolutionary movements this great transformation produced. [3-0; 3-0]

406. (3) *History of France since 1715.*—In a given year, the course may emphasize a specific theme or period, e.g., French society, politics, and thought in the eighteenth century; Revolutionary France 1787-1871; France from the Paris Commune to the crises of 1968. [3-0; 3-0]

407. (3) *History of Modern Germany.*—The political, social and intellectual history of modern Germany from 1789 to the present, with some emphasis on the preceding centuries. [3-0; 3-0]

408. (3) *History of the Habsburg Monarchy, 1273-1918.* [3-0; 3-0]

413. (3) *The Reformation.*—An examination of European history, 1500-1650, with emphasis on the Protestant Reformation and its revolutionary impact on religious life, economic life, political activity and social behaviour. [3-0; 3-0]

415. (3) *History of the Human Sciences.*—Studies in the history of the major themes in the "human sciences" and social thought from the seventeenth to the twentieth century. The writings of major social theorists will be discussed and related to their time. [2-1; 2-1]

418. (3) *Economic and Social History of Industrial Britain, 1660-1830.*—The development of industrial society in Britain in the eighteenth century, with special reference to the process of industrialization, the social impact of industrialization, the impact of Scotland, Ireland and the commercial empire. [2-1; 2-1]

419. (3) *Great Britain Since 1832.*—An examination of the social and cultural changes in Britain from the late 18th to the early 20th centuries. Emphasis will be placed on the ways that institutions, families, social groupings and religious, aesthetic and other values responded to and influenced the changes which produced the world's first industrial, urban society. [2-1; 2-1]

420. (3) *Evolution of the Canadian Constitution.*—Concentrates on the evolution of parliamentary government since the late eighteenth century, federal-provincial relations since Confederation and civil liberties in the twentieth century. Contemporary constitutional issues are examined in historical perspective. [3-0; 3-0]

421. (6) *Honours Tutorial.* [0-2; 0-2]

422. (3) *Modern Japanese History Since 1800.*—The building of a modern state, its crisis in the 1930's, and its postwar recovery; topics include business institutions, politics, imperialism, intellectual syncretism, social change, and Japan's growing influence in the world. (Same as Asian Studies 422.) [3-0; 3-0]

423. (3) *Economic and Business History of Modern Japan.*—From 1800 to the present; emphasis on the business strategies of Japan's largest companies; attention also to broader economic topics such as international trade, government policy, social impact of industry, business and politics, labour, and post-1971 multi-nationalism. [3-0; 3-0]

425. (3) *War and Society.*—Continuity and change in the relations of war and society, the connections between the economy, society, the military, and government in peacetime as well as war; not a course in military history. [3-0; 3-0]

426. (3) *Twentieth-Century Canada.*—A survey of the political, social and economic developments which have shaped contemporary Canada. [3-0; 3-0]

428. (3) *Intellectual History of the United States from the Colonial Period to the Present Day.*—Examines the evolution of the American mind from the Colonial period to the present, with emphasis on patterns of thought that have developed in response to American conditions. [3-0; 3-0]

429. (3) *History of the American West.*—A social and political history dealing with such topics as the mission system of the Southwest, fur trade frontier, Mexican War, Oregon question, white-Indian clash, problems of Plains settlement, western dissent and violence. [3-0; 3-0]

430. (3) *Development of Canadian External Policy since Confederation.*—Examines the history of Canada's external relations since Confederation with particular emphasis on Canada's changing international status and role in the twentieth century. [3-0; 3-0]

431. (3) *Population in History.*—Examines selected demographic themes in world-wide historical perspective, the history of the family, urbanization, overpopulation, population growth and industrialization, Malthusian theory and related problems of Third World countries. [3-0; 3-0]

432. (3) *Diplomacy of the Great Powers from the Early 20th Century.*—Examines the international relations of the great powers from the end of the First World War to the mid-1960's. [3-0; 3-0]

433. (3) *Fourth-Year Honours Seminar.* [0-2; 0-2]

434. (3) *History of Southeast Asia Since 1800.*—The modern history of Vietnam, Laos, Cambodia, Thailand, Burma, Malaysia, Indonesia, and the Philippines. Special attention to the revolutions in Vietnam, Burma and Indonesia. (Same as Asian Studies 434.) [3-0; 3-0]

435. (3) *Communist Movements in Eastern Europe since 1900.*—Emphasis on the smaller countries of the Communist orbit. The Soviet Union will be dealt with for background and for comparative perspectives. [3-0; 3-0]

436. (3) *The Foreign Policy of the United States from the Revolutionary Period to the Present.*—A survey of its historical development, examining the influence of ideas, traditions, and the domestic political system on policy choices, as well as the policies adopted. [3-0; 3-0]

437. (3) *The American Impact on Canada.*—An examination of the influence of the United States' rise to continental, hemispheric, and world power on Canada in the areas of economics, culture, defence and foreign policy. [2-1; 2-1]

438. (3) *History of the Soviet Union.*—The role of the Communist party, the evolution of Soviet society, the transformation of the Soviet economy and the techniques of government under Lenin, Stalin and Khrushchev. [2-1; 2-1]

439. (3) *Topics in Canadian History.*—A consideration of historiographical approaches: frontierist, Laurentian, metropolitan and regional. A review of topical approaches: social, economic, ethnic, intellectual and labour; an overview of French-Canadian schools of thought; an introduction to the techniques of historical research. A seminar on major themes in Canadian history, limited enrolment, by permission of the instructor. [0-2; 0-2] For supporting courses, see also Canadian Studies.

440. (3) *Explorations in European History.*—A general subject will be chosen from a range of issues in European history, including early-modern forms of protest and revolution; the modernization of protest and its relationship to competing ideologies; changing forms of authority in industrializing societies; nation-building, bureaucracy, and technology. [3-0; 3-0]

441. (1½) *Anti-Semitism and Nation-Building.*—The Jewish experience from the end of the nineteenth century to the creation of the State of Israel. [3-0]

442. (3) *History of the American South.*—An examination of social, economic, political and cultural issues in the American South from the colonial period to modern times, and of the relation of the region to the nation. [2-1; 2-1]

443. (1½) *The Family in North America.*—Family structure in North America from colonial times to the present, dealing with such topics as marriage, divorce, parenthood, childhood, and inheritance; the development of feminism; and the relationship of the family to other institutions. [2-1]

444. (1½) *Slave Societies in the Americas.*—A comparative analysis of the institution of chattel slavery, its growth, its effects on slaves and masters, its relation to the larger society, and the causes of its decline, in the various cultures of the Americas. [2-1]

445. (1½) *Urbanization in the United States.*—The development and consequences of urbanization in the United States, with examples drawn from a number of specific cities; some material on Canadian cities will be included. [2-1]

446. (1½) *Dissent and Violence in American History.*—A study of the major areas of dissent and violence in the United States from the American Revolution to the present. [2-1]

447. (3) *Seminar in American History.*—Offers the opportunity to study in depth some of the major problems in United States' history. Areas of concentration, depending on the instructor's interests, will include the American Revolution, ante-bellum reform movements, the settlement of the west, and urbanization in modern America. Prerequisite: History 237 or its equivalent. [0-2; 0-2]

448. (1½) *Diplomacy and Conflict in the Middle East, 1948 to the Present.*—International relations in the Middle East, with special emphasis on the conflicts between Israel and her neighbours. [3-0]

449. (6) *Honours Essay.* [0-2; 0-2]

450. (1½/3)**d** *Selected Topics in Latin American History.*—A study in depth of one major topic (such as the Cuban Revolution or Peronismo) in the recent history of Latin America. Usually offered alternatively with 350. [3-0; 3-0]

451. (1½/3)**d** *Selected Topics in Peninsular History.* [3-0; 3-0]

460. (3) *Britain in the Twentieth Century.*—Changes in class structure; private vs. public education; decline of the imperial economy; impact of two world wars; impact of the depression; end of empire and its effects; racial conflict in Britain; nationalization of industry; balance of payments; the welfare state; entry into the Common Market. [2-1; 2-1]

470. (3) *Seminar in Medieval History.*—Annually changing topics of medieval studies with special attention to research methods on primary sources. [0-2; 0-2]

480. (3) *Economic and Social History of Modern China to 1949.*—An examination of the effects of population pressure, agricultural and commercial growth, initial industrialization, urbanization, government policies and popular rebellion upon family and kinship, voluntary associations, social stratification, migration and social practices in late imperial and republican China. (This course is the same as Asian Studies 480.) [3-0; 3-0]

482. (3) *History of Rural Societies in Asia..*—A study of the historical structures and transformations of rural societies in Eastern, Southeastern and Southern Asia, from the 18th century. (Same as Asian Studies 450.) [3-0; 3-0]

489. (1½) *Selected Topics in Luso—Brazilian History.* [3-0]

500-504. (3) *Readings in Canadian History.*

505-509. (6) *Seminar in Canadian History.*

510-514. (3) *Readings in American History.*

515-519. (6) *Seminar in American History.*

520-524. (3) *Readings in British History.*

525-529. (6) *Seminar in British History.*

530-532. (3) *Readings in Imperial-Commonwealth* History.

533-534. (6) *Seminar in Imperial-Commonwealth* History.

535-537. (3) *Readings in Medieval History.*

538-539. (6) *Seminar in Medieval History.*

540-542. (3) *Readings in Renaissance-Reformation* History.

543-544. (6) *Seminar in Renaissance-Reformation* History.

545 (3) *Canadian Historiography and Historical Methods.*—Introduction to the dominant themes in Canadian historiography. Emphasis on the examination of changing emphases and methods of historical enquiry. While a broad national perspective will be maintained, certain topics in Western Canadian history will receive more detailed consideration. Admission to this course is limited to students in the Master of Archival Studies degree program (or in special cases, by permission of the instructor).

547. (3) *Readings: Special Topics in History.*

548. (6) *Historiography.*

549. (6) *Master's Thesis.*

550-552. (3) *Readings in French History.*

553-554. (6) *Seminar in French History.*

555-557. (3) *Readings in German History.*

558-559. (6) *Seminar in German History.*

560-561. (3) *Readings in Russian and East European History.*

562-563. (6) *Seminar in Russian and East European History.*

564-566. (3) *Readings in Modern European History*

567-569. (6) *Seminar in Modern European History.*

570. (3) *Readings in Comparative Asian History.*

571. (3) *Readings in Chinese History.*

572. (3) *Readings in Japanese History.*

573. (3) *Readings in Southeast Asian History.*

574. (3) *Readings in South Asian History.*

575. (6) *Seminar in Comparative Asian History.*

576. (6) *Seminar in Chinese History.*

577. (6) *Seminar in Japanese History.*

578. (6) *Seminar in Southeast Asian History.*

579. (6) *Seminar in South Asian History.*

580-581. (3) *Readings in Intellectual History.*

582. (6) *Seminar in Latin American History.*

583. (3) *Readings in Latin American History.*

584-585. (3) *Readings in Economic and Social History.*

587-588. (3) *Readings in Diplomatic History.*

589. (6) *Seminar in Diplomatic History.*

590-591. (3) *Readings in Ecclesiastical History.*

593-594. (3) *Readings in Military History.*

595. (1½) *Oral History and Genealogy.*—Emphasis on research and collecting techniques. Review of existing programs concerned with collecting oral history. Admission to this course is limited to students in the Master of Archival Studies degree program (or in special cases, by permission of the instructor).

649. *Ph.D. Thesis.*

History of Medicine and Science (Faculty of Medicine)

Note: History of Medicine 400 and 401 are elective courses in the Faculty of Medicine but are highly **recommended** for all Medical students who are not enrolled in special programs approved by the Faculty. They are also listed by the Department of History for credit in a **History Major**, and are **recommended humanities electives** in the Faculty of Science.

400. (1½) *History of Medicine to the end of the Nineteenth Century.*—A study of the main ideas in medicine and health care from primitive times to the threshold of scientific medicine. First term. Prerequisite: Biology 101 or 102. [2-1-0; 0-0-0]

401. (1½) *History of the Health Sciences in the Twentieth Century.*—A study of the main developments in the health sciences in the modern era, including the social history of health care and the development of scientific health care. Second term. Prerequisite: Biology 101 or 102. [0-0-0; 2-1-0]

501. (1½/3)**c** *History of Medicine.*—Course of directed study in topics selected by the students in consultation with the professor. [0-3-0; 0-3-0]

Home Economics Education (Faculty of Education)

404. (3) *Curriculum and Instruction in Home Economics (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in home economics, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

561. (1½-6)**c** *Laboratory Practicum.*

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

Human Nutrition (School of Family and Nutritional Sciences, Faculty of Arts)

511. (1) *Current topics in Protein and Amino Acid Nutrition.*—A combined lecture and seminar course dealing with recent advances in protein and amino acid nutrition. Alternate years. [0-0; 2-0]

513. (1) *Current Topics in Lipid Nutrition.*—A combined lecture and seminar course dealing with recent advances in lipid nutrition. Alternate years. [0-0; 2-0]

515. (1) *Current Topics in Vitamin Nutrition.*—A combined lecture and seminar course concerned with advanced topics in vitamin metabolism and function. Alternate years. [2-0; 0-0]

517. (1) *Current Topics in Mineral Metabolism.*—A combined lecture and seminar course dealing with recent advances in mineral and trace element metabolism. Alternate years. [2-0; 0-0]

519. (1½) *Assessment of Nutritional Status.*—The use of dietary, anthropometric, biochemical and related information for the assessment of nutritional status of human populations. Laboratory assignments will demonstrate data collection and processing procedures, including computer processing of dietary and biochemical data. Alternate years. [2-3; 0-0]

521. (1½) *Advanced Community Nutrition.*—Factors influencing food availability and consumption and resulting nutrition of health populations. Discussion periods will focus on legislation influencing food policy and on various public agencies which serve groups facing nutritional risk. Alternate years. Prerequisite: Consent of Instructor.

523. (1½) *Practicum in Community Nutrition.*—The planning, implementation, and evaluation of a representative nutrition program. Each student's project will be conducted under the auspices of a local health agency and will focus on a group facing potential nutritional risk. Alternate years. Prerequisite: Advanced Community Nutrition 521.

525. (1½) *Current Topics in Nutrition Education.*—Analysis and interpretation of current research. Techniques for planning, conducting and evaluating educational programs. Alternate years.

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531. (1) *Nutrition Seminar*.—Students or guests present seminars on current topics in nutrition. Required of all first-year graduate students in Human Nutrition. After the first year, graduate students are expected to attend without credit.

547. (1-3)**c** *Directed Studies*.—In special cases, directed studies on certain aspects of Nutrition may be arranged for graduate students in attendance.

549. (3/6)**c** *M.Sc. Thesis*.

649. *Ph.D. Thesis*.

Indic Languages—See Asian Studies.

Industrial Education (Faculty of Education)

Note: These courses have been discontinued and will be offered only as required to meet the needs of currently registered students.

230. (3) *Electricity in Industrial Education I*.—D.C. fundamentals and circuits; D.C. motors and generators; signal circuits; electro-chemical devices; D.C. measurement; residential wiring circuits. Organization for instruction. [3-3; 3-3]

252. (3) *Principles of Technical Drawing*.—Lettering; descriptive geometry; orthographic projection; sections; auxiliary views; sketching; technical illustrating; fastenings; methods of drawing reproduction; surface development. Organization for instruction. [2-4; 2-4]

308. (1½) *Craft Skills Development*.—Fundamentals of basic hand tool processes. The design and construction of craft projects in wood, metal and acrylic. Organization for teaching construction activities in elementary and special education programs. Not normally for credit in an Industrial Education major.

350. (3) *Technology of Woodworking I*.—Fundamentals of bench and machine woodwork; design and layout; hand and machine tool maintenance. Organization for instruction. [2-4; 2-4]

351. (3) *Technology of Metalworking I*.—An introduction to bench metalwork and light machine work; lathe and shaper operations; heat treatment of carbon steel; forging; founding; welding and related metallurgy; project planning; teaching aids and shop management. Organization for instruction. [2-4; 2-4]

353. (3) *Design in Industrial Education I*.—Functional, structural and aesthetic aspects of design applied to Industrial Education projects. [2-4; 2-4]

354. (1½) *Oxyacetylene and Arc Welding*.—(a) Oxyacetylene: fusion welding mild steel; flame cutting; testing and inspection of welds; bronze welding; silver alloy brazing, aluminum welding. (b) Arc: practice in common types of weld in mild steel; bronze welding. Organization for instruction. [1-2; 1-2]

355. (3) *Electricity in Industrial Education II*.—Single and polyphase circuit analysis; alternating current machinery and controls; generation and distribution of electrical energy. Organization for instruction. Prerequisite: Industrial Education 230. [3-3; 3-3]

356. (3) *Electronics in Industrial Education I*.—Fundamental circuits; vacuum tubes and semi-conductor devices as applied amplifiers and power supplies; measurements. Organization for instruction. Prerequisite: Industrial Education 230. [3-3; 3-3]

357. (1½) *Industrial Coatings*.—Theory and practice of applying industrial finishing materials; manual and mechanical application to wood, metal and synthetic surfaces. Organization for instruction. Prerequisites: Industrial Education 350 and 351. [1-2; 1-2]

358. (3) *Electronics in Industrial Education II*.—Data generation, transmission, and receiving systems; principles of HF, VHF, UHF, and microwave communication systems. R.F. measurements. Organization for instruction. Prerequisite: Industrial Education 356. [3-3; 3-3]

359. (3) *Production Woodwork*.—Serial production of articles primarily constructed of wood; design, planning and construction for short-run production; prefabrication techniques. Organization for instruction. Prerequisite: Industrial Education 350. [2-4; 2-4]

360. (3) *Power Mechanics Theory and Practice*.—Heat engines — internal and external combustion types; fuels; mechanical and hydraulic power transmission; power control. Organization for instruction. [3-3; 3-3]

361. (1½) *Measurement Theory and Practice*.—Principles and practices of electrical measurements; design and construction of measurement devices. Organization for instruction. Prerequisites: Industrial Education 230 and 356. [1-2; 1-2]

404. (1½/3)**d** *Curriculum and Instruction in Industrial Education (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a major in industrial education, or Director's permission. Co-requisite: Education 398 or 499. [1.5-0-4; 1.5-0-4]

450. (3) *Technology of Woodworking II*.—Design and layout of contemporary furniture; elementary finishing; production principles and techniques. Organization for instruction. Prerequisite: Industrial Education 350. [2-4; 2-4]

451. (3) *Technology of Metalworking II*.—An intermediate course in bench metalwork and light machine work; operations on lathe, shaper, surface grinder and milling machine; heat treatment, forging, welding and related metallurgy; students design and manufacture individual items. Organization for instruction. Prerequisite: Industrial Education 351. [2-4; 2-4]

452. (3) *Technology of Building Construction I*.—Design and construction of single unit residential buildings; custom and prefabrication methods; western platform frame, and post and beam construction. Organization for instruction. Prerequisite: Industrial Education 350. [2-4; 2-4]

453. (3) *Automotive Theory and Practice I*.—General construction of power plant, auxiliary systems, fuels, carburetion, lubrication, cooling systems, clutch, brakes, gear box, rear axles, drive shafts, universal joints, front suspension and steering gears. Organization for instruction. Prerequisites: Industrial Education 351, 360. [2-4; 2-4]

454. (3) *Pattern-Making and Foundry Practice*.—Influence of foundry techniques and metallurgy on design; practical application of various types of patterns; core box making; green sand moulding; coremaking; gating; practice; melting and pouring brass, iron, and aluminum alloys. Organization for instruction. Prerequisite: Industrial Education 351. [2-4; 2-4]

456. (3) *Electronics in Industrial Education III*.—Transducers; processors; transmission; deprocessing; transducers for readout and display. Organization for instruction. Prerequisite: Industrial Education 356. [3-3; 3-3]

457. (3) *Technology of Metalworking III*.—Methods of forming, joining, machining, heat treating and finishing of metals. Design analysis and the development of manufacturing techniques. Organization for instruction. Prerequisite: Industrial Education 451. [2-4; 2-4]

458. (1½/4½)**d** *Problems in Graphic Representation*.—Specific drafting problems associated with each of the following specialties: (a) Construction: millwork and furniture drawings, small boat design; national and local building codes; descriptive geometry. (b) Electricity-Electronics: layout and representation of problems in electrical and electronic design. (c) Metals-Mechanics: surface development; gearing; descriptive geometry. Organization for instruction. Prerequisite: Industrial Education 252. [1-2; 1-2]

459. (3) *Materials Technology in Industrial Education*.—Wood and materials directly derived from wood; metals and alloys; synthetics; adhesives; physical testing of materials. Organization for instruction. Prerequisites: Industrial Education 350 and 351. [3-3; 3-3]

463. (3) *Technology of Synthetic Materials*.—Principles and practices of synthetic materials lay-up; forming and extrusion; design and production of moulds and plugs; die casting. Organization for instruction. Prerequisites: Industrial Education 350 and 351. [2-4; 2-4]

464. (3) *Design in Industrial Education II*.—Design principles applied to the kinds of problems commonly encountered in shop work. Prerequisite: Industrial Education 353. [2-4; 2-4]

465. (1½-6)**c** *Technical Problem*.—This course gives the student the opportunity to conduct directed study in an area within his technical field of specialization. Each directed study will culminate in a written paper. Prerequisites: Completion of a technical specialty or equivalent.

466. (3) *Problems in Electrical Equipment Production*.—Fabrication and assembly of electrical and electronic equipment; techniques applicable to the school situation; evaluation of design and manufacturing technique. Organization for instruction. Prerequisites: Industrial Education 230 and 356. [3-3; 3-3]

467. (3) *Automotive Theory and Practice II*.—Advanced automotive design and repair; diagnosis of mechanical and electrical faults; evaluation of modern servicing procedures. Organization for instruction. Prerequisite: Industrial Education 453. [2-4; 2-4]

508. (1½-6)**c** *Review of Research in Educational Methods*.—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

561. (1½-6)**c** *Laboratory Practicum*.

565. (1½/3)**d** *Special Course in Subject Matter Field*.—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education*.—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences*.—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis*.

Interdepartmental (Faculty of Medicine)

402. (1½) *Behavioural Sciences in Medical Practice*.—An elective course for First Year medical students dealing with the psychosocial aspects of human development. The course aims to provide the student with: a grasp of basic concepts about human development useful in assessing personal functioning in health and in illness; an appreciation of the over-arching concept of the life cycle; an exposure to several of the better-known theories about human development; an understanding of how the study of human behavior is approached within a scientific framework. Prerequisites: Admission to the Faculty of Medicine or departmental permission.

426. *Introduction to Clinical Medicine*.—At the end of the Second Term in Second Year there will be a comprehensive written examination set by the clinical departments. In addition, each department may, at its discretion, conduct such further oral and clinical examinations as it may desire. Satisfactory performance in this series of examinations is a prerequisite to promotion to Third Year.

Interdisciplinary (Faculty of Graduate Studies).

549. (3/6)**c** *Master's Thesis*.

649. *Ph.D. Thesis*.

Italian (Department of Hispanic and Italian Studies, Faculty of Arts)

Note: Students with Italian 11 or 12 should consult the Department for placement in appropriate language courses.

Italian

100. (3) *First-Year Italian*.—Grammar, reading and oral practice for beginners. [4-0; 4-0]

101. (3) *First-Year Italian*.—Grammar, reading, composition and oral practice for beginners with previous exposure to Italian or any Italian dialect. [4-0; 4-0]

105. (6) *Intensive Italian.*—An accelerated course. Grammar, reading, composition, with special emphasis on the spoken language. This course is equivalent to Italian 100 and 200. [6-0; 6-0]

200. (3) *Second-Year Italian.*—Reading, writing and oral practice, with constant and systematic reference to the grammatical structure of the language. Prerequisite: Italian 100, or permission of the Department. [4-0; 4-0]

201. (3) *Second-Year Italian.*—Intermediate grammar, reading and composition. Prerequisite: Italian 101 or permission of the Department. [3-0; 3-0]

300. (3) *Introduction to Italian for Senior Students.*—An intensive course aiming to impart a reasonable degree of proficiency in spoken and written Italian. Basic grammar, conversation, progressive reading of literary texts. Prerequisite: a good knowledge of another Romance language or Latin. [3-0; 3-0]

302. (3) *Advanced Composition, Translation and Stylistics.* [3-0; 3-0]

305. (3) *Modern Italian Literature.* To be offered in alternate years. [3-0; 3-0]

306. (3) *Italian Literature from the Origins to the Romantic Period.*—A thematic approach to Italian literary works considered in a broad cultural context. To be offered in alternate years. [3-0; 3-0]

400. (3) *Advanced Studies in Italian Language and Style.*—Required for Honours students. [3-0; 3-0]

401. (3) *Italian Literature of the Middle Ages.*—Dante, Petrarch, Boccaccio and the minor lyric poets. [3-0; 3-0]

402. (1½/3)**d** *Topics in the Literature of the Italian Renaissance.*—The topics in any year may be selected from the following: Italian Humanism; Machiavelli and Ariosto; Tasso and the Literature of the Late Renaissance; Italian Renaissance Drama.

403. (1½/3)**d** *Topics in Italian Literature from the Baroque to Romanticism.*—The topics in any year may be selected from the following: Scientific Prose and Seventeenth Century Drama; Eighteenth Century Drama; The Arcadia and the Italian Enlightenment; The Romantic Debate; Neoclassic and Romantic Poetry; Manzoni and the Novel.

404. (1½/3)**d** *Topics in Modern and Contemporary Italian Literature.*—The topics in any year may be selected from the following: From "Neo-realismo" to the "Avant-garde"; Croce's Role in the Poetics of XXth Century Italian Literature; Carducci, Pascoli, D'Annunzio and the Crisis of Poetical Language; The Evolution of the Modern Italian Novel: Verga, Tozzi, Pirandello, Svevo, etc.; Pirandello and the Revolution of Italian Drama; Italian Poetry of the XXth Century: From Gozzano to Montale.

415. (3) *History of the Italian Language.*

420. (1½/3)**d** *Special Topics in Italian Language and Literature.*—(Can be taken for no more than six units of credit.)

449. (3/6)**c** *Honours Essay.*

500. (3) *Bibliographic Survey of Italian Literature.*

501. (3) *Dante: The Minor Works.*

502. (3) *Dante: The Divine Comedy.*

505. (3) *Studies in the Literature of the Renaissance.*

510. (3) *Studies in Modern Italian Literature.*

520. (3) *Italian Language and Literature.*

549. (3/6)**c** *Master's Thesis.*

Italian Studies

310. (3) *The Divine Comedy in Translation.* [3-0; 3-0]

330. (3) *Introduction to Italian Civilization.*—The development of Italian culture from its origins to the present. In English. [3-0; 3-0]

431. (3) *Literature of the Italian Renaissance in Translation.*—This course alternates with Italian Studies 432. [3-0; 3-0]

432. (3) *Twentieth-Century Italian Culture and Literature in Translation.*—This course alternates with Italian Studies 431. [3-0; 3-0]

Note: Italian Studies 330, 431 and 432 do not count towards the Major or Honours programs. Italian Studies 330 is, however, recommended as an elective for those programs.

Japanese—See Asian Studies, Faculty of Arts

Landscape Architecture—(Faculty of Agricultural Sciences).

**Additional fees are charged for these courses. See "Special Fees" P. 22.

100. (1½) *Introduction to Landscape Architecture.*—Introduction to the process of landscape design. Form, colour, geometry and spatial relationships in the landscape. Studio projects to relate to design and construction. Restricted to B.L.A. students. [0-4; 0-0]

150. (3) *Introduction to Landscape Technology.*—Studies and exercises using the project method in the technology of landscape architecture. The language and techniques of the landscape architect, elementary surveying, manipulation of land forms, grading, drainage and the preparation and interpretation of plans. Restricted to B.L.A. students. [0-4; 0-4]

**199. (1) *Introductory Workshop.*—An introduction to landscape architecture immersing the student in a variety of design and landscape issues related to selected local environments. The workshop provides intensive student, faculty and guest participation over a 7-day period at the end of the summer. It is required that students attend the workshop prior to entering Landscape Architecture 100 and Landscape Architecture 150 in the autumn.

200. (4½) *Studio in Landscape Design I.*—Studio projects that entail application of knowledge and experience in landscape design. Projects will expose and explore theories, techniques, methods, strategies and communication skills central to design processes in landscape architecture. Projects will require the application of information derived from history and theory, which is embedded in the ecological, recreational and resource concerns of society in the use of the larger landscape. Restricted to B.L.A. students. Prerequisite: Landscape Architecture 100.

**220. (1½) *Theory of Landscape Design.*—History and theory of cultural conventions in the designed landscape. Meaning and manipulation of biotic and physical change in the landscape. Key elements in landscape design. Open to other students with permission of instructor. [3-0; 0-0]

300. (4½) *Studio in Landscape Design II.*—Studio projects which integrate previous studio and course work and focus specifically on social and community aspects of landscape architecture in the urban setting. Restricted to B.L.A. students. Prerequisite: Landscape Architecture 200.

340. (1½) *Visual Resource Management.*—Study of the theory, practice and history of visual resource management. Covers methodologies for analysis, planning, design and management of the visual landscape; legislative and public agency guidelines; operational policies of resource extraction industries; and the implication in multiple-use land management. Specific case studies are examined and problems in visual resource management are undertaken by the student. (Same as Forestry 490.) [0-0; 2-2]

**350. (1½) *Urban Landscape Construction.*—The special requirements, considerations and techniques necessary for landscape construction in the urban environment. Prerequisite: Landscape Architecture 100, or permission of instructor. [3-0; 0-0]

400. (4½) *Studio in Landscape Design III.*—A review of the design processes, their success in relation to use and environmental impact. Case studies of specific projects with analysis of concept, design process and efficiency of translation into form, together with the project's contribution to environmental quality and human need. Restricted to B.L.A. students. Prerequisite: Landscape Architecture 300.

401. (3) *Research Project.*—The project is usually undertaken over the two terms of the fourth year and, in some cases, over the preceding summer. Students must consult a Faculty Advisor prior to the end of classes in the third year. Approval for the project must be obtained from the Director of the Landscape Architecture Program and the Chairman of the Department before its initiation, and in any event, not later than October 1.

**450. (1) *Professional Practice.*—An overview of the practice of landscape architecture in Canada; the specific responsibilities of the landscape architect to the client, the profession and the public. [0-0; 2-1]

499. (1½/3)**c** *Directed Studies.*

Latin (Department of Classics, Faculty of Arts)

100. (3) *First-Year Latin.*—For students with no previous knowledge of Latin. [4-0; 4-0]

120. (3) *Latin Language and Literature I.*—Prerequisite: Latin 12. Reading of an anthology of Latin prose and poetry; prose composition. [4-0; 4-0]

200. (3) *Second-Year Latin.*—Prerequisite: Latin 100. [4-0; 4-0]

205. (6) *Intensive Intermediate Latin.*—An intensive course in the structure of the language and practice in reading designed to enable students with only one year of Latin to acquire a competence in the language sufficient to qualify them to enter senior courses. Prerequisite: Latin 100. [5-1; 5-1]

301. (3) *Latin Literature of the Classical Period.*—Readings in the major Latin authors in prose and verse. Prerequisite: Latin 200, or Latin 120. [3-0; 3-0]

305. (3) *Medieval Latin.*—Introduction to Medieval Latin language and literature. Development of a reading knowledge of Medieval Latin through selections from major authors and genres after 400 A.D. Latin Major and Honours students require special approval of the departmental adviser. Prerequisite: Latin 100. [4-0; 4-0]

403. (3) *Latin Poetry.*—Lyric and elegiac poetry; Ovid. [3-0; 3-0]

404. (3) *Comedy and Satire.*—Plautus, Terence, Horace, Juvenal. [3-0; 3-0]

405. (3) *Lucretius and Vergil.*—Selections from Lucretius and from Vergil's *Eclogues, Georgics*, and *Aeneid*. [3-0; 3-0]

407. (3) *The Roman Historians.*—Livy, Tacitus. [3-0; 3-0]

408. (3) *Prose of the Roman Republic.*—Cicero, Caesar, Sallust. [3-0; 3-0]

410. (3) *Advanced Composition.*—Obligatory for Honours students in the Third or Fourth Year. [2-0; 2-0]

521. (1½/3)**c** *Studies in Latin Literature.*

525. (1½/3)**d** *Seminar in Latin Literature.*

530. (1½/3)**d** *Seminar in Roman Archaeology.*

535. (1½/3)**d** *Seminar in Roman History.*

540. (1½/3)**d** *Seminar in Latin Palaeography.*

545. (1½/3)**d** *Seminar in Latin Epigraphy.*

549. (3/6)**c** *Master's Thesis.*

550. (1½/3)**c** *Directed Studies.*

649. *Ph.D. Thesis.*

Law (Faculty of Law)

201. (1½) *Introduction to the Legal Process*—The Adjudicative Process: an overview of the law suit, structure of courts and administrative tribunals, dispute settlement, the doctrine of precedent, the legal profession. Legislation and Social Policy: legislative process and policy formation, statutory interpretation, legislative drafting. [3-0; 0-0]

203. (2½/3)**d** *Canadian Constitutional Law.*—General principles and distribution of powers in the Canadian constitution; civil liberties. [2-0; 3-0]

1986-87

205. (2½/3)**d** *Criminal Law and Procedure*.—Bases of criminal responsibility; principles and objectives of the criminal law and procedure; pre-trial procedure. [2-0; 3-0]

207. (3/3½)**d** *Torts*.—A study of the bases of civil liability for intentionally and accidentally caused harms. [3-0; 3-0]

209. (3/3½)**d** *Contracts*.—Historical development; formation and enforceability of contracts; parties; contractual terms; changes of circumstances; remedies for breach. [3-0; 3-0]

211. (3/3½)**d** *Real Property*.—Historical and conceptual analysis of interests in land, future interests, the Torrens system of land registration. [3-0; 3-0]

213. (0) *Legal Writing and Moot Court*.—Each First Year student will be assigned to a small group for one First Year course. Part of the final mark for that course will be based on grades received for legal writing assignments given from time to time throughout the year. In addition, each student will be required to argue a moot for which a letter grade will be given. Performance in the moot does not affect the year's average, but it is necessary for each student to achieve a satisfactory level of performance in order to receive credit for the year.

300. (1) *Moot Court*.—This course consists of two parts, both to be completed in second year; (a) preparation of a factum and presentation of oral argument at a moot court held in the First term; (b) either (i) acting as a judge, which includes writing a judgment, for a first year moot, held in the Second term; or (ii) with Faculty approval, doing an independent piece of legal research, equivalent to a Law Review note, on a particular aspect of legal practice.

A student's mooting performance will be entered on the record maintained by the Faculty although no entry will appear on the official University transcript beyond one indicating that the course has been completed satisfactorily. A student who does not perform adequately in his own moot will be required to re-moot in the second term of second year or in third year until a satisfactory performance is achieved. Note: A student who participates in any one of the following moot competitions will be deemed to have satisfied both parts of the course: the Grand Moot, the Western Canada Moot Competition, the U.B.C. - U. of Wash. International Moot, or the Jessup International Law Moot Court Competition. A student who is the Editor-in-Chief, one of the three Associate Editors, or the Managing Editor of the U.B.C. Law Review in his second year will also be exempted from both parts of the course.

301. (1½) *Administrative Law*.—Consideration of the system of legal control exercised through non-judicial agencies and the relationship of the courts to the administrative process. [3-0]

303. (1½) *Municipal Law*.—The municipality as a legal entity; its creation, operation and powers; by-laws and their validity; contractual liability; judicial review; business regulation; expropriation and land use control. [3-0]

304. (1/1½)**d** *Land Use Planning*.—The legal and administrative aspects of the regulation of land use and development, focusing primarily on planning, zoning and subdivision control. Recommended: 303 Municipal Law. [2-0] or [3-0]

306. (1) *Advanced Criminal Law*.—An examination of selected topics relating to the substantive criminal law. The course will concentrate on topical problems, including the evaluation of the legislative policy expressed in the Criminal Code in the light of proposals for reform and modern research, the examination of specific offences and categories of offences, defences to criminal charges, and the mentally-ill offender. The course will be designed to provide comprehensive coverage of the topics selected. [2-0]

307. (1) *Advanced Criminal Procedure*.—Selected topics relating to procedural law and practice in criminal matters. [2-0]

310. (1½) *Commercial Transactions*.—The law of sale of goods, bills of exchange, promissory notes, and cheques. [3-0]

311. (1½) *Secured Transactions*.—The problems involved in the creation of security interests in personal property. [3-1]

313. (1½) *Real Estate Transactions*.—The law relating to the sale and purchase of land, real estate agency, and mortgages. [3-0]

314. (1) *Landlord and Tenant*.—A study of the law of landlord and tenant. [2-0]

316. (1) *Insurance Law*.—The general legal principles of life, automobile, fire and other types of insurance; the regulation of the insurance industry. [2-0]

317. (1½) *Creditors' Remedies*.—Remedies of an unsecured creditor; fraudulent conveyances and preferences; builders' liens; bankruptcy. Recommended: 311 Secured Transactions; 310 Commercial Transactions. [3-0]

319. (1) *Consumer Protection*.—Relation of the legal process to the marketplace; history of market practices; appraisal of how the political process treats consumer proposals; the overcommitted debtor; adequacies of government services for the consumer. Recommended: 310 Commercial Transactions; 311 Secured Transactions. [2-0]

321. (1½) *Law of Valuation*.—The legal principles and procedures relevant to the valuation of real and personal property in both private and public law. Specific topics will include the valuation of ships, cars, trees and "unique" chattels, and the valuation of expropriated interests. Also included is an examination of the appointment, legal responsibilities and liabilities of the non-judicial valuer, arbitrator, or expert witness. [3-0]

325. (2) *Business Associations I*.—The law of partnership and corporations, including the rights and duties of directors and shareholders. [2-0; 2-0] or [4-0; 0-0]

326. (1½) *Business Associations II*.—Selected topics such as equity and debt financing, corporate reorganization and liquidation. Prerequisite: 325 Business Associations I. Recommended: 335 Legal Accounting. [3-0]

328. (1) *Securities Regulation*.—The law relating to the distribution of securities. Continuous and timely disclosure requirements and civil liability. Recommended: Law 325 Business Associations I. [2-0]

330. (1½) *Taxation I*.—A survey of the law and practice of income and capital gains taxes. Recommended: Law 335 Legal Accounting or equivalent course. [3-0]

331. (1/1½)**d** *Taxation II*.—This course is designed to follow the basic Taxation course (Law 330) and will cover the taxation of corporations, the taxation of shareholders, and the tax implications of the creation, financing, amalgamation and dissolution of corporations. Prerequisite: 330 Taxation I. Recommended: 325 Business Associations; 335 Legal Accounting or course in basic accounting such as Commerce 151. [2-0] or [3-0]

333. (1) *Estate Planning*.—Financial and tax planning for an individual during lifetime and on death. Prerequisite: 339 Succession; 330 Taxation I; 338 Trusts. Students cannot receive credit for Law 333 and Commerce 357. [2-0]

335. (1) *Legal Accounting*.—(Students who have taken an accounting course for credit cannot take this course.) An introduction to basic accounting theory; statement analysis, valuation, and specific applications of accounting to legal problems. [2-0]

338. (1½) *Trusts*.—History and nature of trusts; express, resulting, implied and constructive trusts; charitable and purpose trusts; administration of trusts; breach of trust. [3-0]

339. (1) *Succession*.—The law of wills and intestate succession, variation of wills, principles of probate and administration of estates. Recommended: 338 Trusts. [2-0]

341. (1) *Equitable Remedies*.—The history and development of equitable remedies such as specific performance, injunctions, declarations, relief against forfeiture, and tracing. [2-0]

343. (1) *Restitution*.—The theory of unjust enrichment as the basis of civil liability; comparison with trends in English and American law relating to restitution; common law quasi-contractual claims; equitable remedies and defences, including change of position, constructive trust, accounting for profits, tracing and subrogation; consideration of historical origins of restitutionary principles. [2-0]

345. (1½) *Industrial and Intellectual Property*.—General principles of law, policy and practice relating to copyright, patents, trade marks, industrial design and various competitive torts such as passing-off and breach of confidence. [3-0]

348. (1½) *Family Law*.—The law of marriage, divorce, maintenance, custody, matrimonial property, and related matters. [3-0]

350. (1½) *Children and the Law*.—The civil and criminal law affecting juveniles; custody, guardianship and adoption. Recommended: 348 Family Law. [3-0]

353. (1½) *Labour Law*.—Union-management relations; the collective bargaining processes; the collective agreement, arbitration and conciliation procedure. The relationship between the union and its membership. Recommended: 301 Administrative Law. [3-0]

356. (1/1½)**d** *Natural Resources*.—A foundation course dealing with legal problems common to the management of natural resources such as fisheries, mines and minerals, petroleum, forests, and water resources. [2-0] or [3-0]

358. (1) *Forest Law*.—Acquisition of timber interests; development, financing and organization of timber companies; regulation of exploitation industry interests; management taxation. Recommended: 356 Natural Resources. [2-0]

359. (1) *Mining Law*.—Acquisition of mineral interests; development, financing and organization of mining companies; regulation of exploitation industry interests; management taxation. Recommended: 356 Natural Resources. [2-0]

361. (1/1½)**d** *Regulation of the Petroleum Industry*.—A study of government regulation through legislative and administrative techniques. Recommended: 356 Natural Resources. [2-0] or [3-0]

362. (1) *Water Law*.—The law relating to the acquisition and protection of water rights; appropriation and riparianism; law relating to public management and planning for water use; constitutional, administrative and policy problems; legal aspects of water quality and conservation. Recommended: 356 Natural Resources. [2-0]

365. (1) *Civil Liberties*.—The relationship between the government and individuals and between groups of individuals, including theories of fundamental rights; the protection of fundamental rights through common law, statutory and constitutional means; legal remedies against discriminatory conduct, and application of particular rights including freedom of speech and religion, equality and due process. [2-0]

367. (1) *Native Peoples and the Law*.—History and present status of the legal relationships between Canada's native peoples and the state, including the concept of aboriginal title to land and resources; the legal effect of treaties; native hunting, fishing and trapping rights; the role of the Indian Act and the nature of the legal regime governing the administration of Indian reserve land; the negotiation and settlement of native claims; alternate forms of confederation and the constitutional entrenchment of the distinctive legal and political rights of native people. In addition to an examination of legal issues, an assessment in a more detailed way than is possible in other courses, of the interface between law and culture. [2-0]

368. (1) *Immigration Law*.—Special inquiries; deportation; extradition; citizenship; practice and procedure before immigration tribunals and the courts. [2-0]

370. (1½) *Jurisprudence—Contemporary Jurisprudential Problems*.—A study of some of the theoretical issues — such as the nature of judicial decision, the relationship of law and morality, and the existence of fundamental rights — which often arise in the course of litigation. [3-0]

371. (1½) *Jurisprudence—Fundamental Concepts of Law*.—A study of some of the fundamental principles and ideas that cut across many areas of the substantive law, including such concepts as fault, intent, legal personality, possession, ownership, justice, and causation. [3-0]

373. (1½) *Jurisprudence—Introduction to Legal Theory*.—An examination of the principal schools of jurisprudential thought. Particular attention will be given to the natural law tradition, legal positivism, legal realism, sociological jurisprudence, and contemporary rights theories. [3-0]

374. (1½) *Jurisprudence—Legal Process*.—A critical examination of the legislative and/or judicial processes. The processes by which various interests become translated into legal rules. The relationships between these processes and the broader social, historical, and political processes of which they form a part. [3-0]

376. (1½) *Jurisprudence—The Western Idea of Law*.—The evolution of Western law from its origins in mythology and patriarchy through to the present time. The impact of the Judaic-Christian, Hellenic and Roman legal traditions will be stressed. Particular atten-

tion will be focused on the relationship of law and state, and the dynamics of liberty, domination, and equalitarianism. The course will have a comparative and interdisciplinary emphasis. [3-0]

379. (2) *Evidence*.—The admissibility and use of evidence in litigation. [2-0; 2-0] or [4-0]

380. (1) *Civil Litigation*.—Problems in the conduct of civil litigation including: ethical considerations; substantive problems such as notice, pleading and discovery; and selected procedural problems. [2-0]

383. (1) *Professional Responsibility*.—A study of the ethical responsibilities of the lawyer and a critical examination of the changing role of the lawyer in society. [2-0]

386. (1½) *Public International Law*.—(Students who have taken Political Science 411 cannot take this course.) The history, sources and evidence of international law and its relation to municipal law; international personality; state jurisdiction; and treaties. [3-0]

387. (1) *International Organizations*.—A study of current international organizations including the United Nations, international economic and social organizations and the institutional aspects of the European Communities. Particular attention is paid to the law-creating role and processes of these organizations. [2-0]

388. (1) *Law of the Sea*.—International law relating to the oceans, including the regimes of inland waters, territorial seas, continental shelves, exclusive economic zones, high seas and the deep sea-bed. Issues affecting Canada, such as fisheries, maritime boundaries, the Arctic seas, and off-shore drilling. [2-0]

390. (1½) *Conflict of Laws*.—A study of the legal problems arising in cases in which the relevant facts cut across provincial or national boundaries. Consideration is given to the rules concerning jurisdiction of the courts, choice of appropriate domestic law and recognition of foreign judgments in such fields as marriage, divorce, nullity, legitimacy, contracts, torts, property, administration of estates, and succession. Recommended: To be taken in Third Year. [3-0]

391. (1) *Maritime Law*.—The law relating to admiralty and marine jurisdiction, carriage of cargo and passengers, rights and duties of seamen and other maritime workers, general average, collision, limitation of liability, salvage, towage, maritime liens, charterparties and other topics. [2-0]

393. (1/1½)**d** *Japanese Law*.—An introduction to the Japanese legal system from a comparative perspective. [2-0] or [3-0]

395. (1½) *Legal History*.—The history of the English common law. The course will focus on those aspects of legal history which furnish a background for a better understanding of contemporary law, procedure and the court system. [3-0]

397. (1/1½)**d** *Economic Analysis of Law*.—An economic analysis of a range of legal issues which may in a given year include: property rights, contract, regulation of the economy, criminal law, expropriation, family law, company law, taxation and civil and criminal procedure. [2-0] or [3-0]

398. (1) *Competition Policy*.—The law and policy relating to the regulation of competition in Canada and other jurisdictions. [2-0]

400. (6) *Clinical Term in the UBC Legal Clinic*.—Open to a limited number of students in second or third year. Students will learn law in a clinical setting under the supervision of members of Faculty and Staff lawyers. The students will act for clients on a wide range of legal matters, and will represent clients before criminal, family and small claims courts and a number of tribunals. The program includes regular seminars and workshops in a variety of areas of law; on skills such as interviewing, counselling, negotiation and advocacy; and on professional responsibility. Students will be expected to read a selection of materials relating to the seminars and workshops. Students will also be required to write a final examination; see 401 Clinical Term: Examination. Prerequisite: 379 Evidence. (May be taken concurrently, with permission.)

401. (1½) *Clinical Term: Examination*.—The examination component of 400 Clinical Term.

402. (3) *Clinical Criminal Law*.—The aim of the course is to teach a basic familiarity with the skills required for the practice of criminal law. Students will represent defendants in summary conviction cases under supervision of an experienced lawyer. Students may not enrol in both 400 Clinical Term and this course. Prerequisites: 379 Evidence and 307 Advanced Criminal Procedure. [6-0]

403. (3) *Clinical Family Law*.—Study of the practical aspects of Family Law. Students will work under the supervision of practising lawyers and will appear in court on behalf of clients. Students may not enrol in both 400 Clinical Term and this course. Prerequisites: 379 Evidence, 348 Family Law. [6-0]

405. (1½) *Trial Advocacy*.—Techniques of advocacy in civil and criminal cases including interviewing, pre-trial preparation, tactical analysis, development of facts, direct and cross examination and various ethical considerations. Students may not enrol in both 400 Clinical Term and this course. Prerequisite: 379 Evidence. [4-0]

407. (1½) *The Lawyer as Counsellor*.—Interviewing, counselling and negotiating from an interdisciplinary perspective. Students may not enrol in both 400 Clinical Term and this course. [3-0]

412. (1/1½)**d** *Topics in Public Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

413. (1/1½)**d** *Topics in Constitutional Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

414. (1/1½)**d** *Topics in Administrative Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

416. (1½) *Communications Law Seminar*.—A study of the regulation of the communications industry. [3-0]

418. (1½) *Seminar in Government Regulation of Business*.—A study of the uses and limitations of legal techniques of economic control. Areas of concern include the conservation of natural resources, combines legislation, government marketing boards, public utility regulation, merchandising and advertising (including trademarks, unfair methods of competition, frauds on consumers, public health and trading stamps), customs, excise and quotas, governmental licensing, and public ownership. Recommended: 301 Administrative Law. [3-0]

420. (1/1½)**d** *Topics in Municipal and Planning Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

422. (1/1½)**d** *Topics in Criminal Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

424. (1½) *Seminar on Administration of Criminal Justice*.—A study of the Criminal Law in operation; police practices; prosecutional discretion; victims of crimes; status crimes; drug offences; civil liberties; non-police functionaries in the ordinary system; trial by newspaper. [3-0]

426. (1/1½)**d** *Topics in Private Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

427. (1/1½)**d** *Topics in Tort Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

428. (1/1½)**d** *Topics in Commercial Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

429. (1/1½)**d** *Topics in Corporate and Tax Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

431. (1½) *Close Corporations Seminar*.—The corporation, taxation, accounting, insurance and estate planning aspects of the close corporation, the formation of corporations, the compensation of executives, the sale or purchase of businesses with reference to the closely-held corporation. Prerequisite: 325 Business Associations I. [3-0]

433. (1/1½)**d** *Topics in Real Property*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

435. (1½) *Real Estate Development Seminar* .—A study of the legal aspects of the development of real estate projects such as shopping centres, sports centres and condominiums. The specific project studied will vary from year to year. Prerequisite: 313 Real Estate Transactions. [3-0]

437. (1/1½)**d** *Topics in Trusts and Estates*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

439. (1/1½)**d** *Topics in Industrial and Intellectual Property*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

441. (1/1½)**d** *Topics in Family Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

444. (1/1½)**d** *Topics in Labour Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

446. (1½) *Labour Law Seminar*.—Selected problems in the area of labour law and industrial relations. Recommended: 353 Labour Law. [3-0]

448. (1½) *Labour Arbitration Seminar*.—Labour arbitration and collective agreement negotiation and interpretation. Recommended: 353 Labour Law. [3-0]

450. (1/1½)**d** *Topics in Natural Resources*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

452. (1½) *Environmental Law Seminar*.—Study of the effectiveness of private law remedies. Various alternative administrative schemes for controlling environmental degradation will be investigated. Particular emphasis will be placed on legal aspects of air and water pollution control. Recommended: 301 Administrative Law. [3-0]

454. (1/1½)**d** *Topics in Civil Liberties and Human Rights*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

456. (1½) *Native Claims Seminar*.—The legal context for the negotiation and settlement of native claims. Prerequisite or corequisite: 367 Native Peoples and the Law. [3-0]

458. (1½) *Seminar on Women and the Law*.—History of the legal status of women, present status of women under the legal system, including criminal, labour, family, property, contract, commercial and human rights law, and the penal system. [3-0]

461. (1/1½)**d** *Topics in Jurisprudence*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

463. (1/1½)**d** *Topics in Procedure and Evidence*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

465. (1/1½)**d** *Topics in Litigation and Dispute Resolution*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

467. (1½) *Civil Litigation Seminar*.—Pre-trial problems in civil procedure. May involve some simulation work and an examination of practical solutions. [3-0]

469. (1½) *Negotiation and Dispute Resolution Seminar*.—Negotiation and bargaining; formulation of general principles governing the negotiation process; negotiation in legal practice; alternative means of dispute resolution. [3-0]

472. (1/1½)**d** *Topics in International Law and Transactions*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

474. (1½) *International Law Problems Seminar*.—A research seminar in which selected problems of international law and organizations are investigated. Prerequisite: 386 Public International Law or 387 International Organizations. [3-0]

476. (1/1½)**d** *International Business Transactions*.—The law and policy of international trade and investment. Recommended: 386 Public International Law or 387 International Organizations or equivalent. [2-0] or [3-0]

477. (1½) *Seminar in International Economic Law*.—Current issues relating to the international and national regualtion of trade in goods and services, and foreign investment. [3-0]

478. (1/1½)**d** *Topics in Comparative Law*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

480. (1/1½)**d** *Civil Law*.—An introduction to French and Quebec law. A comparison with the common law system in fields such as contracts, tort and property. May be taught as a course or seminar. [2-0] or [3-0]

481. (1/1½)**d** *Eastern European and Chinese Legal Systems*.—An examination of legal systems that are based on the Marxist philosophy of state and law with emphasis on the Soviet Union and the People's Republic of China. Attention will be given to developing a critical understanding of the Canadian legal system through a comparison with these systems. May be taught as a course or seminar. [2-0] or [3-0]

484. (1/1½)**d** *Topics in Legal History*.—Advanced work in this area. May be taught as a course or seminar. [2-0] or [3-0]

486. (1/1½)**d** *Computers and the Law*.—Selected topics illustrating applications of computer technology in the practice of law and special legal problems created by advances in computer technology, such as protection of privacy, computer crimes, and the legal protection of computer programs. May be taught as a course or seminar. [2-0] or [3-0]

488. (1½) *Seminar on Law and Psychiatry*.—A study of psychiatric and psychoanalytic concepts, their relevance in relation to selected legal problems and the examination of certain problem areas in which the lawyer and psychiatrist come into contact. [3-0]

490. (1½) *Criminology Seminar*.—An examination of particular offence categories such as drug abuse, prostitution, and juvenile delinquency from a criminological perspective. The focus will be on how legal rules become translated into the behaviour of victims, police officers, lawyers, judges, and correctional workers. [3-0]

492. (1½) *Seminar on Methods of Empirical Research*.—An introductory course designed to help lawyers understand the significance of reports prepared by social scientists and the techniques used in their preparation. Consideration will be given to meaning and measurement in research; sampling; questionnaire design; interviewing; the quantification of data; statistical inference and proof; computer applications. [3-0]

495. (1-2)**c** *Directed Research*.—Enrolment restricted. A student will receive credit for no more than two projects of Directed Research.

496. (1-2)**c** *Directed Research*.—Enrolment restricted. A student will receive credit for no more than two projects of Directed Research.

497. (1½) *Law for Teachers: Introduction to Legal Process*.—An introduction to law-related aspects of the school curriculum, including the nature and purpose of law, legal institutions, legal procedures, legal reasoning and skills in dealing with legal materials, such as cases and statutes. Offered extra-sessionally only. Not for credit in the Faculty of Law.

498. (1½) *Law for Teachers: Introduction to Substantive Law*.—An introduction to areas of law such as family, constitutional, criminal, labour, contract, tort, and property law. Comparative, historical, economic and political aspects will be discussed together with legal aspects. Offered extra-sessionally only. Not for credit in the Faculty of Law.

500. (2) *Current Legal Problems*.

501. (1-3)**c** *Directed Research*.—Students will be able to undertake advanced research into a topic approved by a faculty member, under the supervision of, and in consultation with, that faculty member.

549. (10) *Master's Thesis*.

Librarianship (School of Library, Archival and Information Studies, Faculty of Arts)

500. (2) *Sources of Information and Their Use*.—The transfer of information through the medium of recorded documents, and the types of information sources which have been developed to assist this process. Question analysis; search strategies for both printed and machine-based sources. Reference work in the library.

505. (2) *Organization of Published Information*.—The nature of bibliographic information, and techniques for organizing and presenting it. Basic subject analysis, verbal and classificatory. Introduction to technical services.

510. (2) *Libraries, Communities and Collections*.—The structure and governance of the library as an institution serving public, academic, school or special user communities, and the development, maintenance and utilization of resource materials for each community. Aspects of library systems and resource sharing. Categories of personnel and their roles within librarian and information-service organizations.

520. (1½) *The History and Technology of Communications*.—Past and present technologies by which information is processed, stored, and communicated. The economic and social aspects of information transfer. The role of the library as an agent of communications.

600. (2) *Advanced Reference Work*.—Sources and search strategies for the provision of general reference services in various types of libraries. Emphasis on types of materials and the methodology of reference work.

601. (1½) *Resources in the Arts and Humanities*.*

602. (1½) *Resources in the Social Sciences*.*

603. (1½) *Resources in the Sciences and Technology*.*

**The literatures of the several large branches of knowledge viewed in the light of their structure and types of publication; bibliographical control of the literatures; characteristics of research use of the subject literature.*

604. (2) *Services for Adults*.—Guidance to adults, as individuals and in groups, using library resources and facilities; introduction to adult popular literature; library involvement with and service to community groups; problems of the economically, culturally, educationally and physically disadvantaged in their use of library resources and facilities.

605. (2) *Services for Children*.—Book selection and services for the child reader in public libraries; story-telling, book talks, and dramatic presentations; administration of libraries for children. Prerequisite: Librarianship 610.

606. (1½) *Services for Young People*.—Special services to the adolescent; book selection and reference work; advisory services and planned reading activities. Prerequisite: Librarianship 612.

608. (1½) *Legal Bibliography and Information Services*.—Characteristics and organization of legal literature; familiarization with legal terminology; detailed investigation of problems encountered by the law librarian; memorandum writing and law library reference work.

610. (1½) *Literature for Children*.—The development of children's literature from the 15th century to the present and the various societies that produced it; an analysis of world mythology and folklore; an examination of genres, e.g., fantasy, science fiction, historical fiction.

611. (1½) *Contemporary Literature for Children*.—Modern children's literature 1960 to the present; current trends and issues in all fields, including books in translation, that have brought the "new" children's literature into existence.

612. (1½) *Literature for Young People*.—Survey of books of special appeal to adolescents; factors affecting reading interests and habits.

613. (1½) *Audiovisual Materials*.—Selection, administration, storage, and use of materials in audio and video formats.

614. (1½) *Archives and Manuscripts*.—Organization and indexing of non-printed library materials; selection, maintenance, and preservation of historical and administrative records.

615. (1½) *Rare Books and Special Collections*.—Administration of collections of rare books and other special library materials; special physical and bibliographical problems posed by rare or fragile materials.

616. (1½) *Government Publications*.—Bibliography, acquisition, and organization of government publications, with emphasis on those of Canada, Great Britain, the United States, and international organizations; the place of government publications in research.

620. (1½) *Electronic Information Services*.—Use of on-line search services for reference, current awareness, interlibrary loan and document ordering services. Management aspects, including staffing, training, costing and marketing of services. Developments in related electronic systems for compilation and dissemination of information. Prerequisite: Librarianship 626. A laboratory fee is charged for this course (See Index—Fees "Special Fees".)

621. (1½) *Indexes and Indexing*.—Indexing and abstracting documentary materials for the specialist user. Emphasis on manual and machine methods of retrieving information; indexing vocabularies and formats.

622. (1½) *Information Retrieval Systems*.—Design, implementation, and management of machine-based systems for storing and retrieving documentary materials according to their content, with emphasis on the requirements of specialist-user groups.

623. (1½) *Descriptive Cataloguing*.—Basic descriptive cataloguing; principles and practices of applying the Anglo-American Cataloguing Rules and the MARC format to the description of monographs.

624. (1) *Classifications*.—Theory and use of the major classification systems in use in libraries, notably the Library of Congress, Dewey Decimal, Universal Decimal, and Colon classifications.

625. (1½) *Organization of Library Technical Services*.—Management of library operations involving acquisition, preparation, cataloguing and circulation of books, periodicals and other materials.

626. (1½) *Automation and Libraries*.—A survey of current applications of computers to library problems, including cataloguing, reference and research, technical services, and library management.

627. (1½) *Planning and Design of Libraries*.—Programming of library buildings for efficient utilization; planning space requirements for new buildings and alterations; selection of library equipment.

628. (1½/3)**d** *Topics in Library Automation*.—Lectures and readings on specialized topics of current interest in library automation. Prerequisite: Librarianship 626.

629. (1) *Descriptive Cataloguing of Special Materials*.—Principles and practices of applying the Anglo-American Cataloguing Rules and the MARC format to serials, music, manuscripts, audio-visual materials and machine-readable data files. Prerequisite: Librarianship 623.

630. (1½) *Publishing and the Book Trade*.—Commercial aspects of the present-day information industries, from authorship through distribution. Special emphasis on issues of current Canadian interest and on issues most relevant to librarians, e.g. copyright protection and its proposed extensions, the Canadian distribution system, sources of library supply.

631. (1½) *History of Librarianship*.—Development of libraries from their earliest appearance to the present time; their changing role in the development of social and educational institutions.

633. (1½) *Canadian Libraries and Librarianship*.—Special aspects of librarianship in Canada; national, cultural and economic determinants of the library scene in Canada.

634. (1½) *Comparative Librarianship*.—Librarianship throughout the world; practices and theories of librarianship in different national and linguistic contexts.

635. (1½) *Education for Librarianship*.—Theories and practices in the training of professional librarians; special trends in library education.

636. (1½/3)**d** *Current Issues and Trends in Library and Information Services*.—Topics which are of current interest and concern to the profession. Not offered every year.

640. (1½) *Management of Libraries and Archives*.—An introduction to contemporary management theory and its application in the administration of libraries and archives.

641. (1½) *College, University and Research Libraries*.—Purpose and organization of academic libraries; problems of service and collection building; the role of the academic librarian.

642. (1½) *Public Libraries*.—Activities of municipal, regional, and provincial libraries; their relation to their administrative jurisdictions; the public librarian and community.

643. (1½) *School Libraries*.—Principles and practices in school library services; the library in

the educational program of the elementary and secondary school; relationships to students, teachers, and the community.

644. (2) *Special Libraries and Information Centres*.—Design, planning, and operation of libraries and information centres serving industry and research; the role of the special librarian as information officer.

645. (1½) *Medical Libraries*.—Functions of libraries serving medical schools, medical societies, and regional medical services; medical information services to researchers and practitioners; hospital library service.

648. (1½) *Law Library Administration*.—History and development of law libraries; the law library profession and its organizations; law library planning, organization and operations; acquisition and organization of legal materials; collection development; services to the legal profession and the judiciary; directed field study.

651. (1½/3)**d** *Advanced Seminar*.—Consideration of special problems in library service; student preparation of analyses for presentation and group discussion.

652. (1½/3)**d** *Directed Study*.—Individual programs of reading under faculty direction.

653. (1½/3)**d** *Individual Research Project*.—Studies, directed by a faculty member, culminating in a research paper prepared by the student. Prerequisite: LIBR 654.

654. (1½) *Research Methods in Libraries and Archives*.—Principles and methods of research and investigation and their application to various situations in libraries and archives.

661. (1½) *Historical Bibliography*.—The development of the book as a physical object of commerce, and a social force.

662. (1½) *Analytical Bibliography*.—The analysis of the physical book; examination of the evidence which helps solve bibliographic problems; standard techniques for describing that evidence.

Library Education (Faculty of Education)

381. (1½) *The Library in the School*.—The role, philosophy, and administration of libraries in elementary and secondary schools; an examination of school library development and staffing patterns. [3-0; 0-0]

382. (1½) *Services and Programs in Elementary School Libraries*.—Elements of modern reading, listening and viewing guidance programs; the library media specialist's role in relationship to students and teachers; school library design, furnishings, and equipment. Prerequisite: Library Education 381. [0-0; 3-0]

383. (1½) *Selection of Materials*.—The selection and acquisition of print and non-print materials for school libraries. Emphasis is on the principles, philosophy, and policies on which these are based and on the roles played by librarians and teachers in the selection process. [3-0; or 3-0]

384. (1½) *Selection of Materials (Advanced)*.—Selection criteria applied to specific types of materials; special problems in selection; censorship; collection building; publishing; and copyright. Prerequisite: Library Education 383. [0-0; 3-0]

385. (1½) *Introduction to Cataloguing and Organization of Library Materials*.—The principles, philosophy, and policies of organizing print and non-print materials for school libraries; emphasis is on the use of commercial or centralized processing and cataloguing. [3-0; 0-0]

386. (1½) *Classification and Cataloguing*.—Principles and practices of bibliographical description and subject analysis of print and non-print materials with emphasis on original cataloguing and classification. One or two hours of assigned laboratory work. Prerequisite: Library Education 385. [0-0; 2-2]

387. (1½) *The School Library; Sources of Information I*.—Basic principles of reference work and resources used in locating information, with emphasis on the materials used in school collections. [3-0; or 3-0]

388. (1½) *The School Library; Sources of Information II*.—Study of reference tools in specific fields. Search strategies; identifying items and compiling bibliographies. Recent developments in access to information and their implications for the process of learning. Prerequisite: Library Education 387. [0-0; 3-0]

389. (1½) *The Teacher and the School Library*.—A study of school library services and resources, designed to assist a teacher in making the most effective use of library facilities. The relationship between the teacher and the librarian. Not open to students taking a Library Education concentration. [3-0; or 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods*.—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

527. (3) *Seminar in Library Education*.—Research in the field of school librarianship.

561. (1½-6)**c** *Laboratory Practicum*.

565. (1½/3)**d** *Special Course in Subject Matter Field*.—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education*.—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences*.—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis*.

Linguistics (Faculty of Arts)

100. (3) *Introduction to General Linguistics*.—The nature of language; the major language families of the world. Linguistic change: languages and dialects; history of language. Universal features of language: typology and the comparative study of languages. Sound systems; writing systems; theories of grammar; dictionaries; the study of meaning. Language and the individual; language and society. Applications of linguistics. [3-0; 3-0]

200. (3) *General Linguistics: Phonology and Grammar*
Part I.—Introduction to phonetics and phonology: training in the identification and production of speech sounds; principles and methods for describing and writing the sound system of a language; phonological theory with reference to selected languages; laboratory practice.
Part II.—Introduction to grammatical analysis: morphology and syntax; synchronic analysis and description with illustrations from various languages. [3-1; 3-0]

300. (1½) *Studies in Grammar I*.—Generative theories as applied to morphology, syntax and semantics. Throughout this course the data will be taken from English. Prerequisites: Linguistics 200 or English 329. [3-0; 0-0]

301. (1½) *Studies in Grammar II*.—More advanced studies in the areas covered in Linguistics 300, including a critical examination of current contributions to syntactic theories. Prerequisite: Linguistics 300. [0-0; 3-0]

310. (1½) *Phonetics Practicum*.—Practice in the discrimination, production and description of sounds in a variety of languages. Prerequisite: Linguistics 100 or 200 or 420 or English 329. [0-0; 3-0]

312. (1½) *Introduction to Phonetics*.—Organs of speech. Articulatory phonetics. Phonetic alphabets. Training in the identification and production of speech sounds. Not available for credit to students majoring in Linguistics or who have taken 200. [3-0; 0-0]

315. (3) *Biological Foundations of Language*.—Some basic aspects of the speech chain: the anatomy of the speech mechanism, speech in relation to current linguistic theories, the psycho-physical methods of testing. An outline of speech perception research. Prerequisite: Linguistics 200 or permission of Instructor. [3-0; 3-0]

319. (3) *Comparative and Historical Linguistics*.—The nature and development of language; the history of alphabetic writing: the diachronic and diatopic study of language; linguistic change; the classification of languages with particular stress on the Indo-European group. Prerequisite: Linguistics 200. [3-0; 3-0]

320. (1½/3)**d** *Romance Linguistics*.—The Indo-European background; Classical and Vulgar Latin; the origin, development and spread of the Romance languages; their vocabulary, phonology, morphology, syntax; vernacular Latin texts and Romance texts. [3-0; 3-0]

330. (1½/3)**d** *Seminar in Linguistics*.—Reports and group discussions on linguistic problems (restricted to majors). [0-3; 0-3]

350. (3) *Language Acquisition in Children*.—Introduction to the study of language acquisition in children: linguistic analysis of phonological, syntactic, and semantic stages of development. Other topics include babbling, bilingualism, and environmental influences. Prerequisite: Linguistics 200. [3-0; 3-0]

400. (1½) *Studies in Phonology I*.—Generative theories as applied to morphophonology and phonology. Throughout this course the data will be taken from English. Prerequisites: Linguistics 200, or English 329. [3-0; 0-0]

401. (1½) *Studies in Phonology II*.—More advanced studies in the areas covered in Linguistics 400, including a critical examination of current contributions to phonological theory. Prerequisite: Linguistics 400. [0-0; 3-0]

405. (1½/3)**d** *Morphology*.—Analytic problem-solving and discussion of theoretical questions concerning the development and present status of morphological theory. Topics include: problems in the identification and classification of morphemes, the analysis of morphophonemic alternation, Item and Arrangement as opposed to Item and Process descriptions, principles governing the word-formation processes of inflection, derivation, and compounding, and discussion of the form, place, and function of a morphological component within grammar. [3-0; 3-0]

415. (1½/3)**d** *Experimental Phonetics*.—Introduction to the use of instruments for experimental phonetic research and to the design of phonetic and phonological experiments. Prerequisite: Linguistics 310, 315, or permission of instructor. [1-4; 1-4]

420. (3) *Introduction to Linguistics*.—General background to linguistic studies; the different approaches to the analysis of languages; synchronic, diachronic and diatopic linguistics; phonetics, phonology, morphology, syntax, and semantics. This course is not available for credit to students majoring in linguistics. [3-0; 3-0]

425. (1½/3)**d** *Linguistic Theories of Translation*.—Modern linguistic theories concerning translation; the evaluation of these by the study of samples of translation in various languages with emphasis on written translation; linguistic concepts relevant to oral translation; critical assessment of machine translation. It should be noted that this course does not include practical training in the translation of any specific language or languages. [3-0; 3-0]

427. (1½/3)**d** *Introduction to Semantics*.
Part I.—Lexical analysis: the linguistic sign, language and thought, semantic fields and componential analysis, basic semantic relationships.
Part II.—Syntax and semantics: propositions and semantic cases, anaphora, negation, quantifiers, semantic interpretation in current syntactic theories. Offered in alternate years. Prerequisite or corequisite: Linguistics 300. [3-0]

430. (1½/3)**d** *Honours Seminar in Linguistics*.—Research papers on general linguistic topics to be read and discussed. [0-3; 0-3]

431. (1½) *Field Methods: Phonology*.—Elicitation, transcription, organization, and analysis of phonological data from a native speaker of a language not commonly studied. Practical experience in the use of conventional field work equipment. Offered in alternate years. Prerequisite: Linguistics 200, 310, and 400. [3-0; 0-0]

432. (1½) *Field Methods: Morphology and Syntax*.—Elicitation, transcription, organization and analysis of morphological and syntactic data from a native speaker of a language not commonly studied. Practical experience in the use of conventional field work equipment. Offered in alternate years. Prerequisite: Linguistics 200, 310, and 300. [0-0; 3-0]

433. (3) *North American Indian Languages*.—Survey of the native Indian languages of North America. Study of the basis of genetic classification of these languages and areal similarities among them. The structure of representative languages will be presented and contrasted. The present status of American Indian languages will be considered. [3-0; 3-0]

435. (1½/3)**d** *Language Typology and Universals.*—Introduction to the typological and contrastive study of languages — phonology, morphology, syntax, and semantics; the relation between typology and universals; the role of universals in linguistic theory. [3-0; 3-0]

440. (1½-3)**d** *Regional Linguistics.*—Introduction to the diatopic study of language at the level of dialect; linguistic surveys, linguistic atlases. [3-0; 3-0]

445. (1½/3)**d** *Sociolinguistics.*—The systematic study of language as a social phenomenon; language and social change; the social context of speech and the function of language varieties from the speakers' point of view; language use, language attitudes, and language norms in small group interactions as well as in large speech communities, including multilingual situations. The material will, of course, be treated primarily from a linguistic point of view. [3-0; 3-0]

447. (1½/3)**d** *Topics in Linguistics.* [3-0] or [3-0; 3-0]

448. (1½/3)**d** *Directed Studies.*—Supervised by a faculty member chosen by the student. Agreement of Supervisor and approval of Head required. [3-0] or [3-0; 3-0]

449. (3) *Honours Essay.*

501. (1½/3)**d** *Syntactic Theory.*—Discussion and critical analysis of the literature on current issues in syntactic theory. Prerequisite: At least one year of syntax.

505. (1½/3)**d** *Issues in Morphological Theory and Analysis.*—Morphology from both historical and theoretical perspectives. Prerequisites: LING 301, 401, or equivalents.

509. (1½) *Phonological Theory and Analysis I.*—Prerequisite: Linguistics 400 and 401.

510. (1½) *Phonological Theory and Analysis II.* Prerequisite Linguistics 509.

515. (3) *Language Structure Seminar.*

519. (1½/3)**d** *Problems in Comparative and Historical Linguistics.*

520. (1½/3)**d** *Problems in Grammatical Analysis.*

525. (1½/3)**d** *Problems in Semantics.*

530. (1½/3)**d** *Linguistic Problems in a Special Area.*

531. (1½) *Field Methods in Linguistics I.*

532. (1½) *Field Methods in Linguistics II.* Prerequisite: LING 531.

533. (1½/3)**d** *Indian Languages of the Northwest.*

538. (1½/3)**d** *Seminar on Language Acquisition in Children.*—Linguistic analysis of data from children learning a first language. Intensive examination of a topic that will vary each year dealing with advanced research into phonological, syntactic, and semantic aspects of language acquisition.

540. (1½/3)**d** *Problems in Dialectology.*

545. (1½/3)**d** *Problems in Sociolinguistics.*

546. (1½/3)**c** *Directed Reading in Topics related to Linguistics.*

549. (3-6-9)**c** *Master's Thesis.*

649. *Ph.D. Thesis.*

Marine Science (Biology program, Faculty of Science)

400. (3) *Directed Studies.*—A course of directed studies under the supervision of a member of faculty. The study will involve a research project approved by the supervisor in the field of interest of the student, and will be designed to take maximum advantage of the laboratory and/or field opportunities offered by the Marine Station. (Note: the member of faculty supervising the study may be a member of the teaching staff participating in the curriculum offered at the Marine Station; a member of faculty of WCUMBS spending the summer at the Marine Station as a research investigator; or the student may be indirectly under the supervision of a member of faculty at one of the members of WCUMBS.)

401. (3) *Special Topics in Marine Biology.*—This course will be offered, as opportunities arise, by distinguished scientists visiting at the Bamfield Marine Station. It is expected that the course will generally be of a specialized nature and be at a level appropriate to graduate or senior undergraduate students.

402. (1½) *Special Topics in Marine Biology.*—This course will be offered, as opportunities arise, by distinguished scientists visiting at the Bamfield Marine Station who are prepared to offer a course extending over a 3-week period. This course will be of a specialized nature and at a level appropriate to graduate or senior undergraduate students.

410. (3) *Marine Invertebrate Zoology.*—A survey of the marine phyla, with emphasis on the benthic fauna in the vicinity of the Marine Station. The course includes lectures, laboratory periods, field collection, identification and observation. Emphasis is placed on the study of living specimens in the laboratory and in the field.

411. (3) *Comparative Invertebrate Embryology.*—A comprehensive study of development of marine invertebrates available at the Bamfield Marine Station, including all major phyla and most of the minor phyla. Prerequisite: prior course in invertebrates or embryology.

412. (3) *Biology of Fishes.*—Classification, physiology, ecology, behaviour and zoogeography of fishes with particular emphasis on those in the marine environment of the British Columbia coast. Prerequisite: course in comparative vertebrate anatomy. Credit will be given for only one of Marine Science 412 and Zoology 415.

413. (3) *Biology of Marine Molluscs.*—Advanced course of selected topics emphasizing functional morphology, ecology and evolution. Field trips survey representative molluscs of the Bamfield region. Students are expected to complete an independent field or laboratory study of selected molluscs. Prerequisites: Marine Science 410 or equivalent.

420. (3) *Marine Phycology.*—A survey of the marine algae, with emphasis on the benthic forms in the vicinity of the Marine Station. The course includes lectures, laboratory periods, field collection, identification and observation. Emphasis is placed on the study of living specimens in the laboratory and in the field.

430. (3) *Marine Ecology.*—An analytical approach to biotic associations in the marine environment. Opportunities are provided for study of the intertidal realm in exposed and protected areas, and of beaches and estuaries, in the vicinity of the Marine Station; plankton studies and investigations of the subtidal and benthic environments by diving and dredging are encouraged.

435. (3) *Introduction to Biological Oceanography.*—An introduction to the biology of oceans, with supporting coverage of relevant physics and chemistry. Emphasis will be placed on plankton biology, community structure and life histories, and influencing environmental factors. Collections will be made from sheltered inlets, through Barkely Sound to offshore waters. The course will involve both field and laboratory studies of plankton organisms. Prerequisites: Botany 301; Zoology 205, or their equivalents. Credit will be given for only one of Marine Science 435 and Zoology/Oceanography 316.

440. (3) *Biology of Marine Birds.*—Study of interrelationship of birds and the marine environment. Census techniques and observation of birds in field will be emphasized. Prerequisite: completion of a course in vertebrate zoology or permission of the Instructor.

445. (3) *Biology of Marine Mammals.*—Survey course covering systematics and distribution of marine mammals, their sensory capabilities and physiology, with special emphasis on the Cetacea. The course will involve an independent field study. Prerequisite: introductory vertebrate zoology.

446. (3) *Comparative Ethology.*—A comparative study of marine animals (vertebrate and invertebrate) emphasizing behavioural description, underlying physiological behaviour mechanisms, the biological significance of behaviour and behavioural evolution. The course will include independent laboratory and field studies. Prerequisite: introductory courses in invertebrate zoology, vertebrate zoology, ecology, and physiology. Credit will be allowed for only one of Marine Science 446, Zoology 323, and Psychology 306.

500. (3) *Directed Studies.*—Research project approved by the supervisor in the field of interest of the student designed to take maximum advantage of the laboratory and/or field opportunities offered by the Bamfield Marine Station.

501. (3) *Special Topics.*—6 weeks. Offered, as opportunities arise, by distinguished scientists who are visiting at the Bamfield Marine Station. The course will be of a specialized nature.

502. (1½) *Special Topics.*—3 weeks. Offered, as opportunities arise, by distinguished scientists who are visiting at the Bamfield Marine Station. The course will be of a specialized nature.

Mathematics (Faculty of Science)

NOTE: The first digit in the number of a course is intended to convey the level of mathematical maturity at which the course is conducted rather than the year in which it must be taken.

A student will be denied entry into a third year course should only 50% be obtained in a prerequisite second year course.

Students who expect to follow an Honours Science program or one with a high mathematical content are urged to apply for admission to Mathematics 120 and 121.

***For Students in the Faculty of Applied Science.**

100. (1½) *Calculus I.*—Derivatives and antiderivatives of the elementary functions. Applications of the derivative: graphing, max-min problems, and growth-decay problems. Prerequisite: Mathematics 12 or Algebra 12. [3-1; 0-0] or [0-0; 3-1]

101. (1½) *Calculus II.*—Antidifferentiation; techniques of integration; definite integrals and applications (e.g. length, moments, etc.); series; Taylor expansions for the elementary functions. Prerequisite: Mathematics 100, 111 or 120. [0-0; 3-1] or [3-1; 0-0]

111. (3) *Elementary Calculus.*—Calculus; topics from algebra, geometry, and trigonometry in the context of calculus. Mathematics 100 and 111 are equivalent as prerequisites to further courses in Mathematics. Credit will not be given for both Mathematics 100 and 111. Faculties that require Mathematics 12 for admission to First Year will grant 1½ units of credit only for this course toward a degree. Prerequisite: Mathematics 11 or Algebra 11 or the equivalent. This course is not intended for students with recent credit for Mathematics 12, Algebra 12 or equivalent. [3-1; 3-1]

120. (1½) *Differential Calculus.*—Continuous functions, differentiation, graphing, mean value theorem, applications. Prerequisite: Mathematics 12 or Algebra 12 and permission of Head of the Department. [3-1; 0-0]

121. (1½) *Integral Calculus*—The Riemann integral, techniques of integration, areas, volumes, infinite series, Taylor expansions. Prerequisite: Mathematics 120, or Mathematics 100 and permission of Head of the Department. [0-0; 3-1]

130. (3) *Finite Mathematics.*—Intended primarily for students not in the Faculty of Science who wish to have some exposure to mathematical thinking. The course gives an introduction to probability, statistics, linear programming and game theory. Areas of application are chosen in the main from the social and biological sciences. Prerequisite: Mathematics 11 or Algebra 11. Students who obtain credit for Mathematics 101, or Statistics 105 or 203 cannot in the same year, or in later years, obtain credit for Mathematics 130. [3-0; 3-0]

140. (1½) *Introductory Calculus I.*—Derivatives and rates of growth, exponential and circular functions, differentials, chain rule, implicit differentiation, maxima and minima, curve sketching. Not for credit in the Faculty of Science. Credit will be given for only one of Mathematics: 100, 111, 120 or 140. Prerequisite: Algebra 12. [3-1; 0-0]

141. (1½) *Introductory Calculus II.*—The definite integral, techniques of integration. Introduction to linear optimization and matrix algebra. Partial derivatives, maxima and minima with constraints. Not for credit in the Faculty of Science. Credit will be given for only one of Mathematics: 101, 121, 141. Prerequisite: Mathematics 140, 111, or 100. [0-0; 3-1]

*152. (1½) *Linear Algebra and Differential Equations*.—Vectors and matrices; dot and cross product; complex numbers; determinants and eigenvalues; linear differential equations and applications. Corequisite: Mathematics 154. [0-0-0; 3-0-0]

*153. (1½) *Differential Calculus*.—Derivatives and analytic geometry; applications of differentiation to graphing, optimization, growth-decay problems; numerical applications: Newton's method, tangent line approximation and error estimates. Prerequisite: Algebra 12. [3-1-0; 0-0-0]

*154. (1½) *Integral Calculus*.—Antidifferentiation and techniques of integration; numerical integration; applications of definite integrals (areas, mass, work, first-order differential equations); Taylor series and applications. Prerequisite: Mathematics 153. [0-0-0; 3-1-0]

200. (1½) *Calculus III*.—Partial derivatives, total differentials. Chain rule and applications. Path integrals and path dependence. Double and triple integrals. Prerequisite: Mathematics 101 or 121. [3-0; 0-0] or [0-0; 3-0]

201. (1½) *Calculus IV*.—Parametrizations, inverse and implicit functions, integrals with respect to length and area; grad, div, and curl; theorems of Green, Gauss, and Stokes. Prerequisite: Mathematics 200. Corequisite and recommended prerequisite: Mathematics 221. [0-0; 3-0]

205. (1½) *Probability and Statistics I*.—Probability, conditional probability, random variables, discrete and continuous probability distributions, expectation, bivariate distributions, law of large numbers, and central limit theorem. Prerequisite: Mathematics 101. Mathematics 205 and Statistics 205 are the same. [3-0; 0-0] or [0-0; 3-0]

220. (1½) *Analysis I*.—Sequences and induction; convergence of numerical sequences and series, monotone convergence and Cauchy criterion; limits, continuity and differentiability in one variable. Prerequisite: 2nd class in Mathematics 101 or 121. [0-0; 3-0] or [3-0; 0-0]

221. (1½) *Matrix Algebra*.—Systems of linear equations, operations on matrices, determinants, eigenvalues and eigenvectors, diagonalization of symmetric matrices. Prerequisite: Mathematics 101 or 121. [3-0; 0-0] or [0-0; 3-0]

222. (3) *Linear Algebra*.—Linear systems, vector spaces, linear transformations, inner product spaces, spectral theory, applications to differential equations. Prerequisite: Second class in Math 120/121 or first class in Math 100/101. [3-0; 3-0]

225. (3) *Advanced Calculus*.—Partial differentiation, implicit functions, extrema, multiple integration, parametrization. Limits and continuity, vector analysis, line and surface integrals, theorems of Green, Gauss, and Stokes, applications. Prerequisite: At least second class in Mathematics 121 or first class in Mathematics 101. Corequisite: Mathematics 222 or 221 in the first term. Credit will only be given for one of Mathematics 225 and 200 plus 201. [3-0; 3-0]

*253. (1½) *Multivariable Calculus*.—Partial and directional derivatives; maxima and minima; Lagrange multipliers and 2nd derivative test; multiple integrals and applications. Prerequisite: Mathematics 154. [3-0-0; 0-0-0]

*254. (1½) *Vector Calculus*.—Space curves and vector differentiation; vector fields; path integrals; surface integrals; the divergence theorem; the theorems of Stokes and Green. Prerequisite: Mathematics 253. [0-0-0; 3-0-0]

*255. (1½) *Ordinary Differential Equations*.—Review of linear systems; nonlinear equations and applications; phase plane analysis; Laplace transforms; numerical methods. Prerequisite: Mathematics 152, 154. Corequisite: Mathematics 253. Credit will be given for only one of Mathematics 165, 255 or 315. [3-0-0; 0-0-0]

*257. (1½) *Partial Differential Equations*.—Introduction to partial differential equations; Fourier series; the heat, wave and potential equations; boundary-value problems; numerical methods. Prerequisite: Mathematics 255. Corequisite: Mathematics 254. Credit will be given for only one of Mathematics 257 or 316. [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

300. (3) *Applied Analysis I*.—Complex variables with applications including Laplace transform, Fourier analysis, and one or more topics chosen from special functions, calculus of variations, tensor analysis and group theory. Corequisite: Math 225 or 201, and Math 316 or 323 or 257; alternatively, prerequisite: Math 316 or 257. Credit will be given for only one Math 300 and 321. [3-0; 3-0]

301. (3) *Ordinary Differential Equations*.—First-order equations, theory of linear equations and systems with applications, stability, singularities, power series solutions, eigenvalue problems, orthogonal polynomials, oscillation theory, introduction to optimal control (as time permits). Prerequisites: Mathematics 220, 221 and 315. [3-0; 3-0]

302. (1½) *Introduction to Probability*.—Basic notions of probability, random variables, expectation and conditional expectation, limit theorems. Prerequisite: Math 200 or 225. Math 302 and Stat 302 are the same. A student may not obtain credit for more than one of Math/Stat 205, Math/Stat 302. [3-0; 0-0] or [0-0; 3-0]

303. (1½) *Introduction to Stochastic Processes*.—Discrete-time Markov chains, Poisson processes, continuous time Markov chains, renewal theory. Prerequisite: Math 302. [3-0; 0-0] or [0-0; 3-0]

307. (1½) *Applied Linear Algebra*.—Dependence/independence, bases and orthogonality; linear transformations from R^n to R^m; change of basis; triangularization; quadratic forms in n variables. Prerequisite: Mathematics 221 or 222. [3-0; 0-0] or [0-0; 3-0]

310. (3) *Geometry*.—Euclid's axioms, projective geometry, other systems, elements of combinatorial topology. Prerequisite: Mathematics 221 or 222. [3-0; 3-0]

311. (3) *Elementary Number Theory and Algebraic Concepts*.—Primes, units and unique factorization for integers and polynomials. Gaussian integers, arithmetic in quadratic fields and other topics. Prerequisite: Mathematics 221 or 222. [3-0; 3-0]

314. (1½) *Real Variables*.—Riemann integral, uniform convergence, interchange of limits, orthogonal functions, other topics. Prerequisite: Mathematics 220. Credit will be given for only one of Mathematics 314 and 320. [3-0; 0-0] or [0-0; 3-0]

315. (1½) *Elementary Differential Equations I*.—First-order equations; linear equations; linear systems; trajectory analysis of plane nonlinear systems. Applications of these topics will be emphasized. Credit will be given for only one of Mathematics 255 and Mathematics 315. Prerequisites: Math 200 (or Corequisite Math 225) and Math 221 (or Corequisite Math 222). [3-0; 0-0] or [0-0; 3-0]

316. (1½) *Elementary Differential Equations II*.—Laplace transform; power series methods (ordinary and regular singular points, Bessel's equation); boundary value problems and separation of variables (Fourier series and other orthogonal series); applications to the vibrating string, heat flow, the vibrating membrane, etc. Prerequisite: Mathematics 315. Credit will be given for only one of Mathematics 256, 257 or 316. [0-0; 3-0] or [3-0; 0-0]

320. (3) *Real Variables*.—Properties of R^n, Bolzano-Weierstrass theorem. Properties of continuous functions on subsets of R^m. The Riemann integral. Differentiation of mappings from R^n to R^m. Uniform convergence, interchange of limits. Improper integrals. Power series. Uniform approximation of continuous functions by polynomials. The inverse-function and implicit-function theorems. Initial-value problems. Fourier series. Prerequisite: Second class standing in Math 225 or in Math 200, 220, 221 (or 222). [3-0; 3-0]

321. (3) *Complex Analysis*.—Complex numbers and functions, differentiability, power series, Cauchy's theorem, Cauchy's integral formula, calculus of residues, analytic continuation, conformal mapping, harmonic functions. Credit will not be given for both Math 300 and 321. Intended for Honours Mathematics students. Prerequisite: At least 2nd class in Math 225 (or 201). [3-0; 3-0]

322. (3) *Fundamental Concepts of Algebra*.—Polynomials, elements of group theory, elements of Galois theory, quadratic and cyclotomic fields. Prerequisite: Second class standing in Math 222 or in Math 221 and 307. [3-0; 3-0]

323. (3) *Differential Equations*.—First order ordinary differential equations, linear o.d.e.'s existence theorems, singularities, Laplace transforms, stability, numerical methods, Fourier series and application to partial differential equations. Prerequisites: At least Second class in Math 225 and Math 222 or 221. Credit will only be given for one of Math 323 and 315/316. [3-0; 3-0]

340. (1½) *Introduction to Linear Programming*.—Linear programming problems, dual problems, the simplex algorithm, solution of the primal and dual problems, some special linear programming problems such as transportation, network flows, etc. Prerequisite: Mathematics 221 or 222. [3-0; 0-0] or [0-0; 3-0]

341. (1½) *Modelling of Discrete Optimization Problems*.—Phrasing of real world optimization problems so they may be tackled by standard techniques such as: linear programming, network flows, dynamic programming, difference equations. Post optimality analysis. Possible additional techniques: game theory, Markov chains, matchings, graph colourings, dimensional analysis. Prerequisite: Math 340. [3-0; 0-0; or 0-0; 3-0]

342. (1½) *Optimization in Graphs and Networks*.—Basic graph theory, emphasizing trees and tree growing algorithms. Problems chosen from: shortest paths, maximum flows, minimum cost flows, matchings, graph colouring. Linear programming duality will be an important tool. Prerequisite: Math 340. [3-0; 0-0] or [0-0; 3-0]

345. (1½) *Applied Mathematics for Continuous Systems*.—Simple continuous spacetime mathematical models of natural and social phenomena and the relevant methods of analysis are studied. Model problems selected from planetary motion, Euler buckling, economic growth, land use in urban planning, traffic flow, water waves and cell cultures. Mathematical topics include calculus of variations, methods of characteristics, regular and singular perturbation, integral transforms and their asymptotic expansions. Prerequisite: Mathematics 315. Corequisite: Mathematics 316 or 323. [0-0; 3-0]

*350. (1½) *Complex Variables and Application*.—Analytic functions. Cauchy-Riemann equations. Power series and Laurent series. Elementary functions. Contour integrals. Poles and residues. Introduction to conformal mapping. Applications of Analysis to problems in Physics and Engineering. Prerequisites: Mathematics 152, 254. [3-0; 0-0] or [0-0; 3-0]

*357. (1½) *Engineering Analysis*.—Complex variables, conformal mapping, variational calculus, Euler-Lagrange equations, constraints, approximate solutions. Prerequisite: Math 254. [0-0-0; 3-0-2*]

*360. (1½) *Real Variables*.—Uniform convergence; orthogonal functions; Fourier series; ordinary differential equations; special functions. [3-0-0; 0-0-0]

*362. (1½) *Linear Algebra*.—Vector spaces; linear transformations and matrices; quadratic forms; characteristic values and vectors; canonical forms. [0-0-0; 3-0-0]

400. (3) *Applied Analysis II*.—Laplace's, wave, diffusion equations, conformal mapping; transform techniques; integral equations; asymptotic methods; physical applications. Prerequisites: Mathematics 300. In exceptional circumstances students with Mathematics 321 instead of Mathematics 300 may be admitted with permission of the Head. [3-0; 3-0]

407. (1½) *Applied Matrix Analysis*.—Norms and condition numbers of matrices; orthogonal matrices; similarity and congruency transformations; useful matrix decompositions involving orthogonal and triangular matrices; variational characterization of eigenvalues of symmetric matrices; perturbation theory for linear equations and eigenvalues; bounds for eigenvalues including Gerschgorin's theorem. Prerequisite: Mathematics 307 or 222. [3-0; 0-0] or [0-0; 3-0]

413. (3) *Introduction to Mathematical Logic*.—Predicate calculus; languages and structures; theories; proofs; models; completeness theorem. Recursive functions; decision problems; Gödel's incompleteness theorem. Prerequisite: at least 12 units of mathematics or consent of Head of department. [3-0; 3-0]

418. (3) *Introduction to Probability and Stochastic Processes*.—Probability spaces, random variables, distribution functions, independence, limit theorems. Random walks, Markov chains, the Poisson process, Brownian motion, and special topics such as branching processes, recurrent events, Gaussian processes, or martingales. Prerequisite: Second class in Mathematics 320. [3-0; 3-0]

420. (3) *Real Analysis*.—Metric spaces, normed vector spaces, compactness, completeness, Baire category, Lebesgue-Stieltjes measures, integration, differentiation, linear functionals, Riesz representation, study of examples of Hilbert and Banach spaces. Prerequisite: at least second class in Mathematics 320. [3-0; 3-0]

422. (3) *Abstract Algebra*.—Groups, Galois theory, modules, representation theory. Prerequisite: at least second class in Mathematics 322. [3-0; 3-0]

423. (3) *Introduction to the Theory of Differential Equations*.—Existence and uniqueness theorems for systems of ordinary differential equations; first order partial differential equations; elliptic, parabolic, and hyperbolic equations. Characteristics; Cauchy-Kowalewski theorem; boundary and eigenvalue problems; eigenfunction expansions. Prerequisite: at least second class in Mathematics 320. [3-0; 3-0]

424. (3) *Introduction to Differential Geometry*.—Manifolds, flows, critical points, Riemannian metrics, curvature and geodesics (mainly for surfaces). Prerequisite: at least second class in Mathematics 320. [3-0; 3-0]

425. (3) *Introduction to Algebraic Topology*.—Point set topology, fundamental group, covering spaces, surfaces, and topics chosen by the instructor. Prerequisite: at least second class in Mathematics 320, 322. [3-0; 3-0]

426. (3) *Calculus of Variations and Optimal Control*.—Necessary conditions of Euler, Weierstrass, Jacobi and Legendre. Erdman corner conditions. Transversality. Fields of extremals. Sufficiency theorems. Hamilton's principle. The problems of Bolza and Mayer. Introduction to optimal control theory. The Pontryagin maximum principle. Applications to science, technology and economics. Prerequisite: Second class standing in Mathematics 320. [3-0; 3-0]

430. (1-3)**c** *Special Topics in Analysis*.—The student should consult the Mathematics Department for the particular topics in a given year. [3-0; 3-0]

431. (1-3)**c** *Special Topics in Geometry*.—The student should consult the Mathematics Department for the particular topics offered in a given year. [3-0; 3-0]

432. (1-3)**c** *Special Topics in Algebra*.—The student should consult the Mathematics Department for the particular topics offered in a given year. [3-0; 3-0]

445. (3) *Topics in History of Mathematics*.—Aspects of the historical development of concepts in one or more of the central branches of mathematics. The syllabus may vary from year to year, but will in any case involve technical mathematics reaching into the post-Gauss period. Prerequisite: at least 6 units of mathematics courses numbered 300 or above (which may be taken concurrently) and consent of the instructor. [3-0; 3-0]

449. (1-3)**c** *Honours Seminar*.—Independent reading by Honours students in Mathematics under the direction of a faculty member.

500. (3) *Methods of Applied Mathematics*.

501. (3) *Measure Theory and Integration*.

502. (3) *Point Set Topology*.

503. (3) *Differential Geometry*.

504. (3) *Algebraic Geometry*.

505. (3) *Ordinary Differential Equations*.

506. (3) *Partial Differential Equations*.

507. (3) *Number Theory*.

508. (3) *Theory of Rings*.

509. (3) *Commutative Algebra*.

510. (3) *Homological Algebra*.

511. (3) *Algebraic Topology*.

512. (3) *Theory of Groups*.

513. (3) *Topological Groups*.

514. (3) *Nonlinear Differential Equations*.

515. (3) *Integral Equations*.

516. (3) *Harmonic Analysis*.

517. (3) *Complex Analysis*.

518. (3) *Probability*.

520. (3) *Numerical Analysis*.

521. (3) *Functional Analysis*.

522. (3) *Geometric Topology*.

523. (3) *Theory of Games and Programming*.

524. (3) *Control Theory and Optimization*.

525. (3) *Fluid Mechanics*.

526. (3) *Dynamical Systems*.

527. (3) *Theory of Elasticity*.

529. (3) *Mathematical Logic*.

530. (1-3)**c** *Topics in Algebra*.

531. (1-3)**c** *Topics in Analysis*.

532. (1-3)**c** *Topics in Topology*.

533. (1-3)**c** *Topics in Geometry*.

534. (1-3)**c** *Topics in Applied Mathematics*.

535. (1-3)**c** *Topics in Differential Equations*.

536. (1-3)**c** *Topics in Numerical Analysis*.

537. (1-3)**c** *Topics in Probability*.

538. (1-3)**c** *Topics in the Foundations of Mathematics*.

539. (1-3)**c** *Topics in Functional Analysis*.

540. (1-3)**c** *Directed Studies in Mathematics*.—Advanced study under the direction of a faculty member may be arranged in special situations.

549. (3/6)**c** *Thesis for Master's Degree*.

556. (1½) *Elementary Partial Differential Equations*.—Oscillation theory. Regular and singular Sturm-Liouville systems. Eigenfunction expansions. Initial and boundary-value problems for the heat and wave equations: method of eigenfunctions. Elliptic equations: Poisson's integral formula, self-adjoint boundary problems, eigenfunctions, Green's function and integral representations. Variational problems: Rayleigh-Ritz method. This course is primarily for graduate students in Applied Science. Prerequisite: Mathematics 257 or 316.

590. (1-3)**c** *Graduate Seminar*.—Presentation and discussion of recent results in the mathematical literature.

649. *Ph.D. Thesis*.

Mathematics Education (Faculty of Education)

369. (3) *Curriculum and Instruction in Elementary Mathematics*.—Introduction to the mathematical knowledge, instructional principles, methods, and materials relevant to the teaching of elementary school mathematics. [3-0; 3-0]

372. (1½) *Mathematics Teaching: Problem Solving*.—Problem solving strategies, and methods for teaching such strategies in elementary schools. Prerequisite: Mathematics Education 369. [3-0; 0-0] or [0-0; 3-0]

373. (1½) *Mathematics Teaching: Geometry and Measurement*.—Topics in geometry, and methods for improving the learning of geometry and measurement in elementary schools. Prerequisite: Mathematics Education 369. [3-0; 0-0] or [0-0; 3-0]

404. (3) *Curriculum and Instruction in Mathematics (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in mathematics, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]

471. (1½/3)**d** *Diagnosis and Remediation in Elementary School Mathematics*.—A clinical course which includes task analyses of the major concept and skill hierarchies, taxonomies of mathematical objectives, and the place of standardized diagnostic testing in elementary mathematics. Prerequisite: Mathematics Education 369; or co-requisite: Mathematics Education 404. [3-1; 1-3] or [3-1; 0-0] or [0-0; 3-1]

485. (1½) *Mathematics History for Teachers*.—A study of the historical development of selected topics from the mathematics curriculum of elementary and junior secondary schools. Among others, the topics will include systems of numeration, methods of calculating, measurement systems. [3-0; 0-0] or [0-0; 3-0]

488. (1½) *Mathematics Education (Elementary)*.—An advanced course in curriculum and instruction. Prerequisite: Mathematics Education 369. [3-0; 0-0] or [0-0; 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods*.—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

545. (1½) *Foundations of Mathematics Education*.

547. (1½) *Mathematics Teaching in the Elementary School*.—Recent theories and research. Prerequisite: Educational Psychology 482.

548. (1½) *Mathematics Teaching in the Secondary School*.—Recent theories and research. Prerequisite: Educational Psychology 482.

549. (1½) *Mathematics Education (Secondary)*.—An advanced course in curriculum and instruction. Prerequisite: Mathematics Education 404.

561. (1½-6)**c** *Laboratory Practicum*.

565. (1½/3)**d** *Special Course in Subject Matter Field*.—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education*.—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences*.—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis*.

601. (1½/6)**c** *Doctoral Seminar*.

699. *Doctoral Thesis*.

Mechanical Engineering (Faculty of Applied Science)

250. (1½) *Engineering Drawing and Computer Graphics*.—Mechanical drawing, detail and assembly drawings, drawing conventions. Introduction to computer aided design: equipment, principles, 2-D and 3-D picture construction, use of graphics terminals. Prerequisite: APSC 151 [1-3-0; 0-0-0]

260. (1½) *Introduction to Mechanics of Materials*. — Theory of beam bending, moment-curvature relation, bending stress, longitudinal shear, deflection; torsion of circular rods; buckling of slender rods, transformation of stress and strain in two dimensions, Mohr's circle. Prerequisites: Mathematics 152, 154 and Physics 175. [3-0-1; 0-0-0]

265. (1½) *Rigid Body Dynamics*.—Kinematics and kinetics of rigid bodies. Kinematics of rigid bodies in 2D including absolute and relative velocities and acceleration, instantaneous centre and Coriolis acceleration. Kinetics of rigid bodies in 2D from Newton's Laws and energy methods including free bodies, systems of bodies, constrained motion and motion about a fixed axis. Impact and impulse analysis. Kinetics of rigid bodies in 3-D, inertia matrix, Euler's equations, gyroscopic effects. Engineering applications are included. Prerequisites: MATH 152, 153, PHYS 170,175 [0-0-0; 3-0-1]

270. (1) *Principles of Energy Conversion*.—Energy resources; renewable and non-renewable. Conversion to heat; combustion, boilers, nuclear fission. Conversion to mechanical energy; internal combustion engines, basic vapor cycles, hydraulic and wind turbines. Direct conversion to electricity; fuel cells, thermoelectric devices. Energy conservation and storage. Environmental impact of conversion devices. Prerequisite: Physics 150. [0-0-0; 2-0-0]

280. (1½) *Introduction to Fluid Mechanics*.—Fluid properties; statics; kinematics, dynamics, energy, and momentum principles for one-dimensional flow; dimensional analysis and similarity; laminar and turbulent flow; pipe flow; principles of turbo-machine flow; forces on bodies in flow. Prerequisites: Mathematics 152, 154; Physics 150, 175. [0-0-0; 3-0-2*]

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290. (1½) *Manufacturing Processes*.—Processes of engineering manufacture, including workshop demonstrations. Computer-aided manufacture; development of languages, machine tool systems, modern and unconventional forming processes. Prerequisites: Mathematics 152, 154; Physics 150,175. [0-0-0; 1-3-0]

340. (1½) *Statics of Marine Vehicles*.—Hydrostatic curves, transverse and longitudinal stability of surface ships and submersibles. Flooding, damaged stability. Launching. Load due to cargo and waves. Prerequisite: Second year Mechanical Engineering program. [0-0-0; 3-0-0]

341. (1½) *Ship Resistance and Propulsion*.—Elementary theory of ocean waves, dimensional analysis, ship resistance and interference. Ship propulsion methods, propeller theory and design. Prerequisite: Second year Mechanical Engineering program. [3-0-0; 0-0-0]

350. (1½) *Engineering Design*.—The synthesis side of engineering: recognizing and defining problems, exercising creative thought, making decisions, communication. Design oriented exercises, case studies and projects. Prerequisite: MECH 250. [2-0-2; 0-0-0]

355. (1½) *Instruments and Measurements*.—Basic electrical measurements, control concepts, transducer characteristics, devices and applications. Data acquisition methods, experimental design. Prerequisites: MECH 260, 280; Corequisite: MECH 365. [2-3-0; 0-0-0]

360. (1½) *Mechanics of Materials I*.—Castigliano's theorem, statically indeterminate beams, frames and rings; bending of curved beams; axisymmetric membrane stresses in shells of revolution; stresses in thick-walled cylinders and rotating discs; principal stresses and stress invariants in three dimensions; yield and fracture criteria. Prerequisite: MECH 260. [0-0-0; 3-0-0]

365. (1½) *Machine Dynamics and Vibrations*.—Machine dynamics, including machine performance, velocity ratio, linkage kinematics, motion of cams, gears and gear trains, and cylinder and Lanchester balancing. Vibration analysis of single degree-of-freedom systems, energy methods, harmonic, periodic and transient excitations, and applications to engineering problems. Introduction to multi degree-of-freedom systems. Prerequisite: MECH 265. [3-0-0; 0-0-0]

370. (1) *Engineering Thermodynamics*.—Thermodynamic properties of working fluids. Control volume analysis of power, propulsion and refrigeration machinery. Application to pumps, turbines and heat exchangers. Engineering applications of the second law of thermodynamics. Reversibility definition and criterion, entropy and second law limitations. Availability and maximum useful work. Critical evaluations of the internal combustion engines. Chemical energy transformation. Prerequisite: MECH 270. [2-0-1; 0-0-0]

371. (½) *Thermodynamics and Heat Transfer Laboratory*.—This laboratory includes a number of experiments designed to illustrate the applications and principles of the material covered in thermodynamics and heat transfer courses. Prerequisite: MECH 370. [0-0-0; 0-3*-0]

375. (1) *Heat Transfer I*.—Steady one-dimensional conduction, composite structures, critical thickness of insulation, extended surfaces. Steady two- and three-dimensional heat conduction. Analogue and numerical methods of solution. Radiation, blackbody laws. Optical properties of surfaces and radiative heat exchange. Thermal boundary layer fundamentals, normalization, approximate solutions. Analogue between heat and momentum transfer to turbulent flows. Liquid metal heat transfer. Boiling and condensation heat transfer. Prerequisites: MATH 255; MECH 270. [0-0-0; 2-0-1]

380. (2) *Fluid Dynamics*.—Frictional effects, free surface flow, gas flow in nozzles and pipes, irrotational flow around bodies, turbomachine design methods. Prerequisites: Mathematics 254, 255, MECH 280. [0-0-0; 3-2*-0]

390. (1½) *Engineering Data Analysis*. —The treatment of uncertainty in experimental results, error analysis, single-variable and two-variable experiments. Prerequisite: First year Engineering program. [3-0-0; 0-0-0]

391. (1½) *Industrial Systems*. —Systems orientation, engineering economics, replacement decisions, resource allocation, inventory systems, project management, waiting line operations, policy decisions, forecasting techniques. Prerequisite: MECH 390. [0-0-0; 3-0-0]

398. (2) *Engineering Report*.—An engineering report based on a suitable aspect of the summer work, as stated in the specifications issued by the Department at the end of Second Year. A fall term course. Prerequisite: English 100 credit and successful completion of the English Composition Test.

440. (3) *Stability and Design Arrangements for Ships*.—Hydrostatic curves; stability at large angles; estimation of dimensions, power, weight, stability and trim; loading due to cargo and waves; ship structural arrangements; rules of the classification societies.[3-0-1; 3-0-1]

441. (1½) *Computer-Aided Ship Design*.—An introduction to computer aided ship design is presented. Topics include numerical procedures applied to form, curve fairing, stability, resistance, propulsion, motion, manoeuvring and strength. [3-0-1]

442. (1½) *Ship Structures and Vibration*.—Structural theory and practice of ship structural design. Longitudinal and transverse strength of hull girder, bending moment, torsion in a seaway, plate theory, development of ship structural design, pressure hull design and ship building materials. Concepts of ship vibrations and their isolation. [3-0-1]

455. (1) *Hydrodynamic Lubrication*.—Physical properties of lubricants; basic hydrodynamic theory applicable to lubrication problems; plane sliding bearings; journal bearings subjected to steady and dynamic loads; elastohydrodynamic lubrication. [2-0-0; 0-0-0]

456. (1) *Boundary Lubrication*.—Mechanisms of metallic friction; lubrication with polar and other compounds; the nature and mechanisms of metallic wear. [0-0-0; 2-0-0]

458. (2) *Industrial Engineering*.—This course will present an overall view of the field of industrial engineering as related to the planning, technology, and personnel aspects involved in operating a manufacturing or service facility in the Canadian scene. [2-0-1; 2-0-1]

460. (1½) *Mechanics of Materials II*—Bending of beams with asymmetric cross-sections; shear flow and shear centre; membrane analogy for torsion, torsion of thin-walled members of open and closed cross-section, torsion of multi-cell members; axisymmetric bending of circular plates and cylindrical shells. Prerequisite: MECH 360. [0-0-0; 3-0-0]

463. (3) *Mechanical Design*.—Properties and selection of materials; stress concentration and fatigue; screws, fasteners, and joints; mechanical springs; rolling and hydrodynamic bearings; spur, helical, bevel, and worm gears; gear trains; shafts; clutches, brakes, and couplings; flexible machine elements. [2-0-3; 2-0-3]

465. (1½) *Dynamics II*.—Lagrange's equations; free and forced vibrations in 2-degree-of-freedom systems; mass, stiffness, and flexibility matrices for n-degree-of-freedom systems; matrix iteration, and various approximate methods of solution; waves and vibrations in rods and beams; nonlinear vibrations. [3-0-0; 0-0-0]

466. (1½) *Automatic Control*.—Process and system characteristics; transient response; the closed loop; block diagrams and transfer functions; control actions; stability; frequency response; Nyquist diagrams; Bode diagrams; Nichols charts; root locus methods; system compensation; industrial and scientific applications. [0-0-0; 3-0-0]

467. (1½) *Advanced Dynamics*.—Advanced topics in vibration analysis, self excited oscillations, satellite librations, theory of stability, analysis of non-linear systems. [0-0-0; 3-0-0]

470. (1) *Thermal Power Generation*—Steam power plant cycles, Rankine cycle, reheat and regenerative cycles, component selection. Gas turbine cycles, Brayton cycle, intercooling, reheat and regeneration. Conditions for maximum cycle efficiency. Combined cycles and binary cycles. Nuclear power generation, reactor types and design. Boiler design and selection, boiler codes. Turbomachinery design and selection. Prerequistie: MECH 370. [2-0-1; 0-0-0)

472. (2) *Project and Design Laboratory*.—Experimental work on projects selected to give research, development, and design experience. [0-3-0; 0-3-0]

473. (1½) *Heating, Ventilating and Air Conditioning*.—Principles of air conditioning; psychrometrics and refrigeration. Heat transfer through building materials. Estimation of heating and cooling loads. Optimum system configurations. [3-0-0; 0-0-0]

474. (1) *Solar Energy Utilization*.—Solar radiation and measurement principles; radiation characteristics of opaque materials, energy storage; collector characteristics and performance; solar heating of buildings; solar ponds, distillation and power conversion. [2-0-1; 0-0-0]

475. (1) *Heat Transfer II*—Conduction of heat in the unsteady state, periodic heat flow. Graphical and numerical solutions. Radiative heat exchange between gray surfaces. Gas radiation. Free convection from plates and cylinders. Boiling regimes and pressure drops. Mass transfer. Simultaneous heat and mass transfer. Heat exchanger design. Counter, parallel and cross flow heat exchangers. Effectiveness, NTU method. Boilers, condensers and cooling towers. Building heat transfer. Prerequisite: MECH 375. [0-0-0; 2-0-1]

477. (1) *Nuclear Energy Conversion*.—Features of nuclear power plant design. Reactor operation, stability and control. Flow and cooling problems in a reactor core. Pressure vessel, pump and piping design. Fuel handling, storage and disposal. Plant siting, environmental concern. Nuclear power production economics. [2-0-0; 0-0-0]

481. (3) *Aerodynamics of Aircraft*.—Methods of theoretical aerodynamics applied to airfoils and wings for both low and high speeds, and related to current Canadian interests; lift-propulsion systems; wind tunnel methods; performance, stability and control; experiments in the wind tunnel. [3-1*-0; 3-1*-0]

482. (1½) *Wind Engineering*.—The special theoretical and experimental problems and methods of aerodynamics relevant to the nature of winds and their steady and oscillatory effects on structures and people; wind energy utilization. [0-0-0; 3-0-0]

491. (2) *Industrial Management*.—Structure of business enterprise, principles of management, principles of engineering economy, industrial relations. [2-0-0; 2-0-0]

501. (1½) *Thermodynamics and Heat Transfer*.—Thermodynamic principles, availability and equilibrium, irreversibility and steady states, heat conduction, convection and radiation.

502. (1½) *Fluid Mechanics*.—Governing equations; viscous incompressible flow, incompressible potential flow; incompressible boundary layers, stability and turbulence; compressible potential flow.

540. (1½) *Marine Hydrodynamics*.—Fundamentals of model testing, ship frictional resistance. Laminar boundary layer theory, turbulent flow on a flat plate. Ship wave resistance. Thin ship theory. Direct measurement of wave resistance.

541. (1½) *Dynamics of Marine Vechicles*.—Water waves, motion of a body in an inviscid fluid, concepts of added mass, damping. Uncoupled and coupled motion of platforms, irregular seaway, dynamic effects, motion, stabilization.

550. (1-3) *Special Advanced Courses*.—Special advanced courses may be arranged for a graduate student upon the approval of the Head of the Department. The credit will not be more than 3 units in any one such course.

558. (3) *Engineering Applications of Statistical Distribution Theory*.—Classical and contemporary theory of the prominent statistical models employed in the Applied Sciences. The Normal, Gamma, Beta, and Extreme Value classes of distributions. Estimation techniques and applications to engineering problems.

561. (1) *Applied Elasticity*.—Stress and strain in three dimensions, fundamental field equations of classical elasticity: equilibrium, compatibility, Hooke's law; plane stress and plane strain, torsion, bending of plates, wave propagation.

562. (1) *Introduction to Continuum Mechanics*.—Cartesian tensors, transformation and invariants of stress and strain, equations of motion and equilibrium, boundary conditions, constitutive equations for elastic, viscous and viscoelastic materials, plastic yield conditions and associated flow rules.

563. (1) *Robotics: Kinematics, Dynamics and Control*—Definitions and classification. Kinematics: homogeneous transformations, manipulator kinematic equations, forward and inverse kinematic solution methods, differential kinematic equations, motion trajectories. Dynamics: Lagrange-Euler formulations, Newton-Euler formulation. Control: methods of control, robot control hierarchy, control of single joint and multiple link manipulators, advanced control methods. [2-0-0; 0-0-0]

564. (3) *Space Dynamics I.*—Dynamics of systems with variable mass, optimization of rocket performance; orbital mechanics, transfer of orbit and rendezvous; theory of patched conics for interplanetary travel; geometry of spatial orbit, orbit determination using Gauss, Laplace and Gibbs methods, introduction to gyrodynamics, theory of stabilized platforms.

565. (1) *Linear Vibrations I.*—Transient and steady-state response of lumped parameter systems; shock response; integral transform and energy methods; electrical analogies; approximate solutions; mechanical impedance and mobility; vibration measuring instruments and systems.

566. (1) *Linear Vibrations II.*—Response of continuous elastic systems such as rods, beams, frames, plates, shells; exact solutions; Rayleigh and Rayleigh-Ritz approximations; numerical and experimental methods.

567. (1) *Nonlinear Elasticity.*—Fundamentals of tensor calculus, covariant differentiation of tensors of general order, applications to continuum mechanics. Stress and strain tensors, equations of motion for elastic materials and viscous fluids in general curvilinear coordinate systems. Solution of some special problems in finite elasticity.

568. (1) *Theory of Plasticity.*—Yield conditions and flow rules; upper and lower bound theorems; elastic-plastic analysis of circular disks, thick-walled cylinders and spheres; torsion; slip-line fields; rigid-plastic analysis of plates and shells.

569. (1/2)**d** *Non-Linear Vibration.*—Phase plane representation, singular points, exact solutions, equivalent linearization, perturbation method, averaging method, variation of parameters, forced vibration, self-excited vibration.

570. (3) *Space Dynamics II.*—Three body and multibody systems, stability of motion near Lagrange points; orbit perturbations due to Earth's oblateness and atmosphere, estimation of satellite lifetime; active and passive stabilization of space vehicles, environmental effects on satellite librations and station keeping.

571. (1) *Turbomachinery.*—Classification and performance of turbomachinery; momentum and energy transfer; 2-D cascade theory and measurements; axial-flow turbines and compressors; radial flow machines; 3-D flow and unsteady flow in turbomachinery.

572. (1½) *Convection Heat Transfer.*—Governing equations for laminar and turbulent flow. Forced convection in internal and external flow. Free, and combined free and forced convection. Heat transfer at high velocities, in rarefied gases and in two-phase flow. Mass transfer.

573. (1) *Radiation Heat Transfer.*—Monochromatic and goniometric surface properties. Energy exchange of grey, non-grey, diffuse, directional or specular surfaces. Absorption coefficient and radiation intensity in gas radiation. Radiation between a gas and its enclosure. Radiation of luminous flames.

574. (1) *Special Topics in Solar Energy Utilization.*—Transmission of solar radiation through partially transparent materials. Focussing collectors. Solar thermal conversion. Modelling of solar heating of buildings and heating of industrial water. Solar thermal storage; materials, systems and optimization. Prerequisite: MECH. 474, CPSC 350.

575. (½-1½)**c** *Special Topics in Heat and Mass Transfer.*

576. (1½) *Advanced Thermodynamics.*—Review of the first and second laws of thermodynamics, the property relations, and the principles of irreversibility and availability. Elements of combustion and thermochemistry with application to power generation devices, incinerators and open fires. Emissions from combustion sources and emission abatement techniques. Combustion engine and flame phenomena are to be covered.

577. (1½) *Applied Statistical Thermodynamics.*—Application of the concepts of quantum mechanics, statistical mechanics, and kinetic theory to the evaluation of thermostatic and transport properties and equilibrium constants. Investigation of the combustion phenomena from a microscopic point of view. Use of statistical thermodynamic methods for evaluating the product distribution energy release, temperature and effective properties in high temperature combustion situations.

579. (½-1½)**c** *Engineering Solar Radiation.*—Measurement of the extraterrestrial spectral and total irradiance. Scattering and absorption of radiation by gas molecules and aerosols. Spectral and total solar irradiance under cloudless skies. Computation of solar radiation entering buildings, greenhouses and solar energy collecting devices. Natural illumination of buildings. Spectral and total irradiance of animals and plants. Photosynthetic light. Topics to suit the special interests of students.

580. (1½) *Theory of Ideal Fluids.*—Topics selected from the kinematics and dynamics of inviscid incompressible fluids in steady and non-steady motion; two-dimensional and axisymmetric potential flows; applications of conformal mapping; free streamline flows; vortex motions.

581. (1½) *Theory of Low Speed Airfoils.*—Linearized and exact potential flow methods for airfoils in steady and non-steady motion, including methods for separated flows; wind tunnel boundary correction theory.

582. (3) *Theory of Real Fluids.*—Derivation of the momentum equation for general fluids; application to simple Newtonian fluids. Exact solutions. Creeping flow: Stokes', Oseen's and Hadamard's problems. Theory of differential equations containing a large parameter. Asymptotic and singular perturbation expansions. Higher order flows around sphere and cylinder. Laminar boundary layer theory: stretched coordinates, similarity solution, wedge flows. Goertler's and Von Mises' transformations. Asymptotic integrations, stationary points, method of steepest descent, divergent series. Approximate methods. Optimal coordinates. Elementary stability problems. Turbulent flows; Reynolds' equations. Theory of locally isotropic turbulence.

583. (1½) *High Speed Gas Dynamics.*—Topics selected from the dynamics of a gas considered as an inviscid continuum; small-disturbance theory; initial and boundary value problems of wave propagation; application to airfoils and wings; slender body theory; characteristics theory and hodograph methods for nonlinear problems; hypersonic flow and wave riders.

584. (1½) *Mechanics of Rarefied Gases.*—Kinetic theory; Boltzmann's equation; collision processes; elementary models; free molecule flow and applications to satellites and semi-satellites.

585. (3) *Aeroelasticity.*—Idealization of elastic systems; elastic axis; influence coefficients; coupled and uncoupled modes of vibration; unsteady aerodynamics; static aeroelastic phenomena; two-dimensional and three-dimensional flutter theory; solution of flutter stability determinant; buffeting and stall flutter; aspect ratio and compressibility effects; flutter model and testing technique.

586. (2) *Turbulent Shear Flow.*—The basic equations of fluid motion; introduction to hydrodynamic stability; Reynolds' equations; energy equations for turbulent motion; intermittency; similarity near a solid boundary and in free turbulence; approximate methods for predicting the growth of turbulent boundary layers and free symmetrical shear flows.

587. (1) *Engineering Acoustics I.*—Acoustic terminology; theory of sound propagation in tubes, ducts, horns; spherical radiation; characteristics of noise sources; theory and design of electro-acoustic transducers.

588. (1) *Engineering Acoustics II.*—Theory of sound in enclosures; subjective assessment of noise; hearing conservation criteria; principles of noise control; case studies; ultrasonic and infrasonic phenomena; underwater acoustics.

589. (1½) *Aerodynamic Noise I.*—The aero-acoustic equations; theories of Lighthill, Curle, and others; basic multipole sources; relevant concepts from random process theory; theories of jet noise, propeller noise.

590. (1½) *Aerodynamic Noise II.*—Physical characteristics of the noise of jets, wakes, boundary layers, separated flow, propellers, fans, and compressors; noise suppression techniques.

597. (3) *Project in Pulp and Paper Engineering.*—Project report on assigned topic of specialization. For students registered in the M.Eng. program in Pulp and Paper Engineering, whose project is supervised by a faculty member in the department of Mechanical Engineering.

598. (1) *Seminar.*—Presentation and discussion of current topics in mechanical engineering research.

599. (3-6)**c** *Thesis.*—For M.A.Sc. degree.

699. *Thesis.*—For Ph.D. degree.

Medical Genetics (Faculty of Medicine)

See also courses listed under Genetics.

410. (1½) *Immunogenetics.*—A lecture course covering current topics in immunogenetics including molecular genetics of antibody diversity, genetics and evolution of the major histocompatibility complex, immunodeficiency diseases and antigenic variation in human pathogens. Emphasis will be on human immunogenetics. Prerequisites: Biology 334 or equivalent and Microbiology 302 or permission of the instructor. [0-0; 3-0]

419. (1½) *Human Cytogenetics.*—A lecture course with laboratory demonstrations dealing with human chromosome variation as it relates to disease. Topics will include chromosome banding techniques, structural and numerical chromosome anomalies, the etiology of chromosome errors and their effect on development, somatic aberrations and population cytogenetics. Prerequisite: Biol. 334. [3-0; 0-0]

420. (1½) *Human Biochemical Genetics.*—A course of lectures and seminars dealing with the genetic basis of biochemical variation in man. Topics will include inborn errors of metabolism, haemoglobin variation, blood groups, polymorphisms, gene mapping and human molecular genetics. Prerequisites: Biology 334 and Biochemistry 300, or equivalent. [3-0; 0-0]

421. (1½) *Oncogenetics.*—A lecture course in which the growing body of knowledge about genetic aspects to cancer will be reviewed at molecular, cellular, organism and population levels. Experimental data from organisms all the way up the evolutionary chain, including humans, will be used. Prerequisite: Biol 334. [0-0; 3-0]

430. (3) *Human Genetics.*—A course of lectures, seminars and directed studies related to the investigation of genetic variations in humans. Prerequisites: Biology 334 and permission of the instructor. [3-0; 3-0]

434. (1½) *Population Genetics.*—Fundamental aspects of population and quantitative genetics with emphasis on experimental observation and examples from natural populations. The distribution of genetic variance in the human species is especially emphasized. Prerequisite: Permission of an instructor or Biology 334, Agricultural Sciences 213, Forestry 302, or equivalent. (Same as BIOL 434). [0-0; 3-0]

440. *Medical Genetics.*—A course of lectures and demonstrations outlining the fundamental principles of genetics as they relate to medical practice. Restricted to students in the Faculty of Medicine and others with the permission of the Department Head.

448. (1½-3)**c** *Directed Studies.*—A supervised individual program of study of a topic to be agreed upon by a member of faculty and the student. Permission of the appropriate supervisor and the Head of the Department is required.

521. (1½) *Advanced Oncogenetics.*—A lecture and seminar course for graduate students covering recent advances in the genetic aspects of cancer. Topics will include cytogenetics, tumor viruses, structure and mechanism of oncogenes, carcinogenesis and mutagenesis. Credit will not be given for both MEDG 421 and 521 or PATH 531. Prerequisite: Biology 334 and permission of instructor. [0-0; 3-0]

530. (3) *Advanced Human Genetics.*

548. (3) *Directed Studies.*—A series of laboratory sessions, directed readings and directed counselling interviews related to selected areas of Medical Genetics. This advanced course may be taken upon approval of the Head of the Department.

702. *Clinical Genetics Clinic.*—A rotation three days per week for three months through the Clinical Genetics Clinic dealing with the techniques of diagnosis and counselling, and of the prenatal diagnoses of genetic disease and genetic counselling relative to congenital malformations and failures of reproduction.

Medicine (Faculty of Medicine)

(See also courses listed under:
Anaesthesiology, Anatomy, Biochemistry, Family Practice, Health Care and Epidemiology, Health Sciences, History of Medicine, Interdepartmental, Medical Genetics, Medicine, Microbiology, Obstetrics and Gynaecology, Ophthalmology, Orthopaedics, Paediatrics, Pathology, Pharmacology and Therapeutics, Physiology, Psychiatry, Radiology, Surgery).

425. *Clinical Diagnosis*.—The methods and application of techniques of clinical history-taking and physical examination, covered by lecture demonstrations and bedside clinics. Correlation of disordered function and anatomical changes as well as analysis of symptoms and signs.

450. *Principles of Medicine*.—1. Systematic lectures are given by members of the department in conjunction with members of other departments under the direction of committees arranging these presentations of disorders in the following groups—cardiovascular disease, dermatology, endocrinology and metabolic disease, gastroenterology, haematology, neurology, renal disease, respiratory disease, rheumatic disease and allergy-immunology. 2. Bedside clinical instruction and individual work on the medical wards are undertaken in which students record case histories and examinations of patients.

451. (1½) *Teaching in Medicine*. —Educational concepts and principles relative to planning and effectively conducting lectures, group discussions, case presentations, bedside clinics, and 1:1 teaching. Elective for third-year medical students.

452. *Laboratory Medicine*.—A course of lectures, laboratory periods and demonstrations in which laboratory diagnosis in clinical medicine is studied. The clinical application and significance of laboratory procedures are emphasized. First term.

475. *Medicine-Clinical Clerkship*.—This consists of a period of eleven weeks in which the student is attached to a clinical teaching unit. During this time the student will carry out under supervision clinical activities of examination and study of patients, and participate in the discussion and management of the problems they present. Opportunities for work in the outpatient department and emergency service is provided. Opportunity for election to work in a specialty field is afforded.

700. *Medical Rounds*.—One hour weekly Departmental Grand Rounds at which educationally important cases or subjects are discussed in depth, both from the clinical and scientific viewpoints, and also one hour weekly Ward Rounds at which problems or especially interesting cases are discussed under the supervision of the Head of the service.

701. *Lecture Course*.—One hour weekly lecture presented by faculty members at which the knowledge of basic sciences is applied to the understanding of disease processes, in the field of General Internal Medicine and its subspecialties.

702. *Seminar-Conference*.—Formal preparation and presentation of topics in small group discussions, one hour weekly.

703. *Directed studies in clinical medicine*.—Supervised investigative or academic work under a designated faculty member.

710. *Nephrology Rounds*.—Discussion of clinical and scientific aspects of educationally important cases six times monthly.

711. *Renal Biopsy Rounds*.—Weekly correlation between clinical status and pathological findings in several patients. (Same as Pathology 709.)

712. Nephrology Seminar.—Formal preparation and presentation of topics in small group discussions. 1 hour weekly.

713. *Directed Studies in Nephrology*.—Supervised investigative or academic work under a designated faculty member.

720. *Clinical Geriatric Medicine*.—Clinical experience under supervision in the assessment and treatment of elderly patients in a Day Hospital setting, an in-patient assessment and treatment unit, and on an acute hospital geriatric consultation service.

721. *Psychiatric Aspects of Geriatrics*.—Clinical experience under supervision in the assessment and treatment of psychiatric problems of elderly patients in multiple health settings including inpatient and outpatient consultation services, acute hospital in-patient units, short stay assessment and treatment units and specialty clinics such as the Alzheimer's Clinic.

722. *Long Term Care (Geriatric Medicine)*.—Clinical experience under supervision in the management of long term care of elderly patients emphasizing clinical care, interprofessional relationships, and interaction with care-givers and community groups.

723. *Geriatric Grand Rounds*.—Lecture or case presentations of current topics or advances in geriatric medicine followed by discussion. One hour twice monthly.

724. *Geriatric Journal Club*.—Review and discussion of important problems in the care of the elderly based on review and presentation of important current journal articles. One hour monthly.

725. *Geriatric Seminar Topics Series*.—A scientific review of major problems encountered in the care of the elderly including a literature review incorporating the most recent information as a basis for continuing discussion of these topics. Two hours monthly.

726. *Family Practice Geriatric Rounds*.—Lecture or seminar presentations of current geriatric medicine topics or case presentations and discussions of interesting patients which focus on principles of assessment and management of elderly patients. One hour weekly.

727. *Geriatric Orthopedic Rounds*.—Case presentation and discussion of orthopedic patients including brief didactic presentations of special problems as they relate to the care of elderly orthopedic patients. One hour weekly.

Medieval Studies (Faculty of Arts—See Medieval Studies under programs in the Faculty of Arts for other acceptable courses.)

200. (3) *Introduction to the Middle Ages*—Selected topics (e.g. Age of Charlemagne, Twelfth-Century Renaissance) studied from an interdisciplinary approach designed to integrate the major areas of history, literature, and art; topics vary from year to year; interested students should consult Medieval Studies adviser, Department of History. [2-1; 2-1]

440. (3) *Medieval Seminar*. [0-2; 0-2]

449. (3/6)c *Graduating essay or Supervised Study*.

Metallurgical Engineering (Faculty of Applied Science)

252. (2) *Metallurgical Engineering Processes*.—Processes for the shaping of metals; melting and casting; applications of heat transfer laws and heat balances to casting processes; mechanical working processes; hot and cold working of metals; analysis of working loads in forging and rolling processes. [0-0-0; 3-3*-0]

262. (1) *Metallurgical Process Calculations I*.—Stoichiometry, material and heat balances on metallurgical processes; enthalpy, combustion, process heat requirements; free energy, entropy and application to metallurgical processes; activity, predominance-area diagrams. [1-0-2; 0-0-0]

264. (1) *Metallurgical Process Calculations II*.—Processes for the extraction and refining of metals; iron and steelmaking, lead, zinc, copper and nickel production; application of heat and material balances, and thermodynamics to process problems. [0-0-0; 1-3*-2]

350. (1½) *Metallurgical Thermodynamics I*.—Thermodynamic and electrochemical principles applied to metallurgical processes; phase rule, heat of reaction, free energy, activity, thermodynamic equilibrium; thermodynamics of aqueous solutions. [0-0-0; 3-0-0]

351. (1) *Process Metallurgy*.—Application of chemical principles to unit processes employed in metallurgical operations; technology of base metal production. A course designed for non-metallurgy students (e.g. MMPE). [2-0-0; 0-0-0]

352. (2) *Process Metallurgy*.—Application of chemical principles to unit processes employed in metallurgical operations; technology of base metal production. [2-3-0; 0-0-0]

360. (1) *Heat Transfer*.—Fundamentals of heat transfer, conduction through solids, forced and free convection, heat transfer coefficients, steady and unsteady state, furnace calculations, heat exchangers, metallurgical heat transfer problems. [2-0-0; 0-0-0]

362. (1) *Mass Transfer*.—Diffusion and mass transfer with chemical reaction; gas-liquid, gas-solid and liquid-liquid systems; analysis of mass transfer processes in metallurgical operations; mixing in continuous and batch processes. [0-0-0; 2-0-0]

370. (1½) *Structure of Metals I*.—Crystal structure in metal systems, production and properties of X-rays; X-ray diffraction applications; introduction to dislocation theory, introduction to electron theory of metals. [3-0-0; 0-0-0]

372. (1) *Physical Metallurgy*.—Alloying of metals; structures, heat treatment and fabrication of ferrous materials. Primarily for students in Mining and Mineral Process Engineering program. [2-0-0; 0-0-0]

374. (1½) *Deformation Processes*.—Plastic deformation in metal systems; work hardening, age hardening and other strengthening mechanisms; creep. [0-0-0; 2-3*-0]

376. (2) *Structure and Properties of Steel*.—The relationship between structure and properties of ferrous alloys; carbon, and alloy steels; principles of heat treatment; high strength steels. [3-3*-0; 0-0-0]

378. (1½) *Phase Transformations and Solidification*.—Rate controlling processes in solid state transformations; phase changes in steel; composition change and composition invariant reactions; the diffusion equations and solution development for phase changes, carburization and homogenization. The solidification process including nucleation, dendritic growth; solute segregation, and constitutional supercooling. Solidification structures in cast metals. [0-0-0; 3-0-0]

380. (2) *Structure and Properties of Materials*.—Strengthening mechanisms; composite materials; heat treatment and properties of steel and other alloys; metal failures; casting and mechanical working; nuclear metallurgy. [2-0-0; 2-0-0]

382. (1½) *Non-Metallic Materials I*.—Refractories and newer developments in ceramics. Phase diagram applications to refractory manufacture, use and problems. Properties of refractories. Thermal stress, high temperature structural applications of newer ceramics. [0-0-0; 2-3-0]

390. (½) *Seminar I*.—Training and practice in public speaking and presentation of technical papers. [0-0-1; 0-0-1]

398. (1) *Engineering Report*.—All students entering Third Year Metallurgy are required to prepare an engineering report. Detailed information on form, content and dates for submission of preliminary and final copies is available in the office of the Head of the Department of Metallurgical Engineering.

450. (2) *Metallurgical Thermodynamics II*.—Thermodynamic equilibria in metal chemistry; surfaces; energetics of metal solutions; thermodynamics of smelting and converting systems; chemical potential and free energy diagrams applied to metallurgical processes. Industrial gas problems, blast furnaces. [3-0-2; 0-0-0]

452. (1) *Iron and Steelmaking*.—Technology and economics of iron and steelmaking; direct reduction, basic oxygen processes; arc furnaces; process sequences; capitalization, structure and economics of the industry. [2-0-0; 0-0-0]

454. (1) *Reactive Metal Processing*.—Extraction and refining of reactive metals; aluminum, titanium, uranium and rare metals; process chemistry technology and economics. [0-0-0; 2-0-0]

456. (1) *Corrosion Engineering*.—Thermodynamics of corrosion (Pourbaix diagrams); kinetics of corrosion (polarization curves); practical aspects of corrosion. [2-0-0; 0-0-0]

458. (1) *Hydrometallurgy*.—Leaching, purification, precipitation regeneration; thermodynamics and kinetics of separation steps; electrochemical applications. Prerequisite: METL 456. [0-0-0; 2-0-0]

462. (1) *Process Modelling*.—Mathematical modelling of metallurgical processes using principle of heat, mass and momentum transfer; numerical methods applied to process modelling; melting and solidification processes; controlled heating and cooling operations. [2-0-0; 0-0-0]

464. (1) *Energy and Fuels*.—Basic considerations in the supply and use of fuels. Combustion, gasification, carbonization and solvent refining. Energy conservation. Description, theory and problem material. This course is the same as CHML 478. [2-0-0; 0-0-0]

466. (1) *Metallurgical Engineering Economics*.—Metallurgical flow sheet construction; capital cost and manpower estimation; discounted cash flow in process cost estimation; economics of the copper, magnesium, aluminum and steel industry. Cost optimization. [0-0-0; 2-0-0]

468. (1) *Thermodynamics Problems*.—Application of thermodynamics to metallurgical processes; iron and steelmaking; ferro-alloy production; matte smelting and converting; blast furnaces; fluidized beds; electrolytic processes. [0-0-0; 1-0-2]

470. (1) *Engineering Alloys*.—The relationship between structure and properties in stainless steel and non-ferrous alloy systems; alloy specification and design criteria. [0-0-0; 2-0-0]

472. (1½) *Welding and Joining*.—Principles of fusion welding, solid state welding, brazing, adhesive bonding, and other processes for joining metals. Metallurgy of welding. Stresses and distortion in welding; welding design. [2-3*-0; 0-0-0]

475. (2) *Fabrication of Metals*.—Fundamentals of the design and analysis of processes for shaping metals and alloys by casting, hot and cold working, cold forming, powder metallurgy, machining, brazing and welding. Metallurgical implications of fabrication processes. Comparative cost analyses. Primarily for students enrolled in 4th year Mechanical Engineering. [2-0-0; 2-0-0]

476. (1) *Casting of Metals*.—Application of solidification principles to the casting of metals. Continuous casting of steel, copper alloys and aluminum alloys. Casting of large steel ingots. Segregation, imperfections and inclusions in castings. Hot tearing during casting. Inverse segregation. Relations between cast structure and mechanical properties. [0-0-0; 2-0-0]

478. (1) *Electron Theory of Solids*.—Classical and quantum theories of the properties of solids; bonding; transport properties; semiconductors; ionic crystals; magnetic materials and superconductors. [0-0-0; 2-0-0]

480. (1) *Fracture*.—Ductile and brittle fracture; creep; fatigue; stress corrosion; behaviour of composites; service failures of components and structures, and related topics. [2-0-0; 0-0-0]

482. (1½) *Non Metallic Materials II*.—Crystalline non metallic solids, silicates, amorphous phases, phase changes, microstructure and properties such as thermal conductivity, thermal stress, electrical conductivity. [0-0-0; 3-0-0]

484. (1) *Refractory Practice and Problems in Metallurgical Industries*.—Deals with detailed refractory applications in metallurgical furnace requirements, specifications and causes of failure. Examples of problems and their solutions will be illustrated. New developments in refractory practice will be outlined. Prerequisite: METL 382. [2-0-0; 0-0-0]

486. (1) *Nuclear Materials*.—Materials selection for nuclear reactors; fuels, clads, moderators, structural components. Processing of uranium, thorium and zirconium. Radiation damage, fission products, nuclear waste management. [0-0-0; 2-0-0]

488. (1) *Strengthening in Alloy Systems*.—Solid solution hardening; precipitation hardening; strain hardening in metals and alloys; structural hardening in steels; thermomechanical processing. [2-0-0; 0-0-0]

490. (½) *Seminar II*.—Weekly seminar for discussion of current technical topics; written report on production methods and economic reports on one of the metals. [0-0-1; 0-0-1]

492. (1) *Powder Metallurgy*.—Production and properties of particulate metals; compaction and other shaping processes; sintering of single and multicomponent powder systems; liquid phase sintering and infiltration applications. [2-0-0; 0-0-0]

494. (1) *Composite Materials I*.—An introductory course dealing with fibres and resins; fabrication processes: properties of composites as laminae and laminates; designing with composites. [2-0-0; 0-0-0]

495. (1½) *Metallurgical Laboratory*.—Experiments and problems illustrating the principles and practice of chemical and physical metallurgy. [0-0-0; 0-5-0]

498. (1) *Engineering Report*.—A comprehensive report based on the student's summer work. Emphasis will be placed on English expression, as well as on the arrangement and accuracy of the material, and on the analytic interpretation of data rather than on description. Draft copy to be handed to the Head of the Department not later than October 1; final typed copy to be handed in on the first day of the second term.

499. (1½) *Design or Research Project*.—The student will have a choice between studying a selected problem in applied metallurgical research or in the analysis and design of a metallurgical process. [0-3-0; 0-3-0]

550. (1-2)**d** *Metallurgical Thermodynamics*.—Application of advanced thermodynamic principles in metallurgical processes.

554. (1/2)**c** *Hydrometallurgy*.—Modern theories of comminution, leaching, purification and precipitation processes. Two units credit will be given when the student undertakes an extra project.

556. (2) *Advanced Process Metallurgy*.—Topics in advanced process metallurgy including: metallurgy of rarer metals, vacuum and inert atmosphere processing, halide metallurgy, fused salt processes, iron and steelmaking.

558. (2) *Corrosion*.—Modern theories relating to corrosion and corrosion protection of metals. Thermodynamic and kinetic phenomena, corrosion measurements, inhibition and passivation, design for corrosive environments, stress corrosion cracking theory. Same as MINL 574.

560. (2) *Metallurgical Transport Processes*.—Principles of heat, mass and momentum transfer applied to metallurgical processes. Analysis of processes using mathematical modelling and numerical analysis. Vacuum refining, continuous casting, blast furnace, gas-solid reactions.

570. (2) *Structure of Metals II*.—Nature and properties of lattice imperfections; dislocation theory and its use to describe work hardening, creep, structure of grain boundaries and other phenomena.

571. (1) *Solidification*.—Advanced topics in solidification. Theories of solidification; eutectic and polyphase solidification; solid-liquid interface morphology; macrosegregation and inverse segregation in castings; microsegregation, homogenization of castings.

574. (1) *Topics in Physical Metallurgy*.—Topics of metallurgical interest in the field of physical metallurgy to be selected for discussion.

575. (2) *Phase Transformations in Solids*.—Nucleation and growth. Precipitation from solid solution—spinodal decomposition, age hardening, eutectoid decomposition, massive and bainitic transformations. Co-operative shear transformations—martensite.

576. (1) *Diffusion*.—Mathematical analysis; Kirkendall effect; mechanisms; theories of self-diffusion and chemical diffusion; grain-boundary and surface effects; theory of sintering.

580. (1) *Metal Fabrication II*.—Current research and analysis of metal fabricating processes such as casting, metal forming, and powder metallurgy.

581. (1) *Sintering Theory*.—Driving force for sintering; theory of sintering in the solid state, and in the presence of a liquid phase; current theory of hot pressing and reactive hot pressing.

582. (1) *Advanced Ceramics*.—Complex silicate structures; ion exchange in silicates; kinetics of solid state reactions; kinetics of high temperature processes.

583. (1) *Non-Crystalline Materials*.—The structure and properties of non-crystalline materials. Chemistry of inorganic glasses, phase separation and crystallization of glass, vitreous carbon, amorphous solids, glass-forming liquids. Emphasis on relations between structure and properties.

584. (1) *Advanced X-Ray Diffraction*.—Single crystal diffraction; spectrometry; line profile analysis; Fourier analysis; diffractometer and film techniques as applied to problems in metallurgy.

585. (1) *Topics in Fracture Mechanics*.—The equations and concepts of linear elastic fracture mechanics. Fracture toughness testing, statistical theories of fracture and proof testing, stress corrosion cracking and static fatigue. Acoustic emission and other nondestructive testing methods. Case studies of large scale fractures of pressure vessels and structures. [2-0-0; 0-0-0]

586. (2) *Electron Metallography*.—The principles of advanced research microscopy utilizing electron beams; transmission and scanning electron microscopy, electron diffraction, X-ray micro-analysis, electron energy analysis.

592. (1-3)**c** *Special Topics in Metallurgy*.—A special advanced course may be arranged on approval of the Head of the Department.

594. (1) *Composite Materials II*.—Mechanical behaviour of composite materials; tensile and compressive characteristics, toughness; fatigue; impact; environmental effects. Prerequisite: METL 494 *Composite Materials I*. [0-0-0; 2-0-0]

598. *Seminar*.—Presentation and discussion of current topics in metallurgical research. A required course for graduate students in metallurgy which carries no academic credit.

599. (6) *Thesis*.—For M.A.Sc. and M.Sc. Degrees— Research studies in chemical metallurgy, physical metallurgy, or ceramics.

699. *Thesis*.—For Ph.D. degree.

Microbiology (Faculty of Science)

Note: Biology 101 or 102 **and** Microbiology 200 are prerequisite to all courses in Microbiology, except Microbiology 153 and 417.

153. (1½) *Applied Microbiology*.—A lecture and lab course on the general principles involved in the study of microorganisms and their relation to human health. The epidemiology of disease and the measures to prevent the transmission of pathogenic organisms will be emphasized. Open only to students in the School of Nursing. [0-0; 2-2]

200. (3) *Introductory Microbiology*.—Fundamental properties of bacteria: structure, metabolic diversity, growth and genetics. Structure and characteristics of viruses. Immunology. Applied Microbiology. Medical Microbiology. Prerequisite: Biology 101 (102). Corequisite: Chemistry 230 (203). [3-2; 3-2]

302. (1½) *Immunology*.—Immunoglobulin structures and functions, current theories of immunoglobulin gene structures, structures and functions of lymphoid organs, the complement system, genetic control of immune responses, the major histocompatibility complex, regulation of immune responses, immunological tolerance, allergies, immunity to infections, and tumour immunology. Prerequisite: Microbiology 200. [0-0; 3-0-1]

307. (1½) *Bacteriology of Food*.—Microbiology of milk, milk products and other foods. An intensive study of the bacteria of significance in the food industries. Role of microorganisms in food spoilage and food preservation. Microorganisms as indices of sanitation and of the acceptability of foods. [2-2; 0-0]

308. (1½) *Food and Industrial Mycology*.—A study of moulds and yeasts of significance in the manufacture and spoilage of food products. Testing and control. Use of moulds and yeasts in industrial fermentations such as production of antibiotics, alcohol, vitamins, etc. [0-0; 2-2]

321. (3) *Microbiological Techniques*.—Procedures and principles associated with the metabolism, genetics and characterization of microorganisms; instrumentation is stressed.

Restricted to Majors and Honours students in Microbiology. Prerequisites: Microbiology 200, Biology 201. Corequisites: Biochemistry 302, Biology 334, Microbiology 324, 325 (the requirements for Biology 201 and Biochemistry 302 can be replaced by Biochemistry 300, with the permission of the Head of the Department). [0-4-2; 0-4-2]

324. (1½) *Regulation of Cell Growth and Division.*— Role of the cell envelope in cell growth and division: energetics, transport, peptidoglycan synthesis and penicillin binding proteins. Regulation of gene expression and macromolecular synthesis in bacteria. Molecular mechanisms of transcription: induction, repression and attenuation. Prerequisites: Microbiology 200, Biology 201. Corequisite: Biochemistry 302 (the requirements for Biology 201 and Biochemistry 302 can be replaced by Biochemistry 300 with the permission of the Head of the Department). [3-0-1; 0-0-0]

325. (1½) *Introductory Bacterial Genetics.*—Differentiation, mutations and genetic transfer in bacteria. Prerequisites: Biology 201, Biochemistry 302, Biology 334 (the requirements for Biology 201 and Biochemistry 302 can be replaced by Biochemistry 300 with the permission of the Head of the Department). [0-0-0; 3-0-1]

402. (1½) *Advanced Immunology.*—Contemporary topics in immunology including the network theory, immune regulation by antigen-specific helper and suppressor factors, immunogenetics, MHC-restricted phenomena, the T cell receptor, tumour immunology and immunological tolerance. Prerequisite: Microbiology 302. [2-3; 0-0]

403. (1½) *Pathogenic Bacteria.*—Discussion of the sources, modes of transmission, methods of identifying and controlling the commoner human and zoonotic pathogens. [0-0; 2-4]

405. (3) *Bacterial Physiology.*—Selected topics in bacterial physiology and relevant methodology. Laboratory projects stress instrumentation and the application of quantitative biochemical techniques to the study of microorganisms. Prerequisites: Biology 201, Biochemistry 302, Microbiology 321 (the requirements for Biology 201 and Biochemistry 302 can be replaced by Biochemistry 300 with permission of the Head of the Department). Not offered each year; consult Department or Faculty. [2-4; 2-4]

408. (1½) *Animal Viruses.*—Discussion of some animal viruses in respect to their structure, mode of replication and identification. Latent virus infections and oncogenic viruses. Mechanisms of antiviral defences. [2-4; 0-0]

409. (1½) *Advanced Microbial Genetics.*—Bacteriophages lambda and MI3 as representative bacterial viruses; genetics of diverse bacteria such as streptomyces, pseudomonads, cyanobacteria; procaryotic cloning vectors; procaryotic transposable elements; trends in genetic analysis of procaryotes. Prerequisites: Microbiology 325 and Biochemistry 302 (or Biochemistry 300 or 303). [0-0; 3-0]

411. (1½) *Pathogenic Fungi.*—Morphology, physiology and immunology of fungi with special emphasis on pathogenic species. Not offered each year; consult Department or Faculty. [2-2; 0-0]

415. *Principles of Pathogenic Microbiology.*—An introductory course for dental students. Basic principles of microbial structure, growth and genetics. Defence mechanisms of the body, pathogenic properties of bacteria and viruses. Discussion of systemic microbial diseases with oral manifestations. Antibiotics. For Students in the Faculty of Dentistry only.

417. (1½) *Introduction to Applied Microbiology.*—A first course in microbiology for advanced science and engineering students interested in the use of microorganisms for research and industry. Basic principles of bacterial structure, metabolic diversity, growth and genetics. Credit will not be given for both Microbiology 417 and 200. [3-2; 0-0]

418. (1½) *Industrial Microbiology.*—Industrial utilization of microorganisms, technology of large-scale cultivation, discussion of selected processes and research procedures. Prerequisite: Microbiology 200 or 417. [0-0; 3-0]

425. (1½) *Oral Microbiology.*—Discussion of the oral microbial flora; characteristics of oral organisms; ecological determinants; pathogenic properties of cariogenic and periodontopathic bacteria. Plaque formation, metabolism and control of bacteria. Restricted to students in the Faculty of Dentistry or others with approval of the Head. [2-2; 0-0]

430. (3) *Seminar in Microbiological Literature.*—Student seminars on selected papers from the Microbiological literature. Compulsory for Honours students. Major students may enrol with permission of the Head of the Department.

448. (1½/3)**c** *Directed Research.*—A library (1½ units) or laboratory (3 units) project in the final year of the Major program with the permission of the Head of the Department. The results are presented in a written report to be reviewed by oral examination. Prerequisite: Microbiology 321.

449. (3) *Research Problem.*—In the Final Year of Honours, a laboratory investigation approved by the Head of the Department. The results are presented in a written report, to be reviewed by oral examination. Prerequisite: Microbiology 321.

502. (1½) *Immunology Seminar.*—Graduate seminar on current subjects of interest. Permission to take the course is granted by the Head of the Department.

503. (1½) *Bacterial Cytology and Genetics.*—Morphology and functional significance of bacterial cell components. The role of nuclear material in determining heritable characteristics of bacteria, viruses and fungi. Spontaneous and induced mutations. Transfer of genetic information by processes of transformation, transduction and recombination.

505. (1½) *Molecular Microbiology.*—The cellular processes involved in microbial growth. Transport processes, energy-yielding mechanisms, bacterial protein synthesizing systems, control mechanisms.

506. (1-3)**d** *Microbiological Research Procedures.*— The application of current research techniques to projects in immunology, bacterial physiology, virology, bacterial ecology and bacterial genetics. Required of all incoming graduate students. Normally taken in conjunction with Microbiology 530. To be taken only with permission of the Head of the Department.

530. (1½) *Seminar in Microbiology.*

548. (3) *Directed Studies on an approved problem.*

549. (6) *Master's Thesis.*

649. *Ph.D. Thesis.*

Mining and Mineral Process Engineering

(Faculty of Applied Science)

201. (1) *Introduction to Mining.*—The nature and scope of mining. The course includes short afternoon field trips. [2-3*-0; 0-0-0]

231. (1) *Introduction to Mineral Processing.*—The nature and scope of mineral processing. [0-0-0; 2-0-0]

300. (1½) *Basic Mining Methods and Equipment-I.*—Open pit and underground mining methods and equipment. Development — drifting, raising, winzing, shaft sinking. Full and partial-face boring machines. Drilling jumbos, raise-borers and raise climbers. Cutter selection for boring operations. [3-3*-0; 0-0-0]

301. (2) *Basic Mining Methods and Equipment-II.*—Introduction to mine services—mine ventilation, drainage, air and water reticulation. Power supply. Noise and lighting. Safety, elementary fire prevention and rescue. Mine maintenance. [3-3-0; 0-0-0]

303. (1) *Rock Properties.*—The study of the mechanical properties of rock materials at the laboratory and field level. The relevance of such studies to common mining problems. [2-2-0; 0-0-0]

304. (1) *Rock Fragmentation.*—Theory and practice of rock fragmentation by drilling and blasting and by machine boring and cutting. Review of less common rock breaking methods. Introduction to explosive types and strengths. Detonators; delay methods of blasting. Charge sizing and choice of explosive; determination of burden. Smooth blasting and splitting methods. [0-0-0; 2-0-0]

331. (2) *Unit Operations I.*—Mineral processing unit operations—sampling, crushing, grinding, screening, classification, gravity separation, magnetic separation, electrostatic separation. [3-3-0; 0-0-0]

332. (1) *Unit Operations-II.*—Solid/Liquid separations; clarification, thickening, filtering and drying. Materials handling: solids and slurries. Testwork for flowsheet design. Flowsheet studies. Marketing ores and concentrates. [0-0-0; 2-3*-0]

333. (1) *Flotation.*—Theory and technology of flotation processes. [0-0-0; 2-3-0]

351. (1½) *Introduction to Valuation.*—Systematic exploration, sampling mineral deposits and estimating ore reserves, elements of valuation. Not for students in Mining and Mineral Process Engineering. [0-0-0; 2-0-2]

391. (1) *Capital and Operating Cost Estimation.*—The methodology to estimate the capital cost and operating cost of green field mine/plant projects. [0-0-0; 2-0-0]

392. (1) *Materials Handling.*—Study of the basic theory of bulk solids and slurry handling. [0-0-0; 2-0-3*]

393. (½) *Seminar.*—Oral presentation of topics by students. [0-0-1; 0-0-1]

394. (1) *Engineering Report.*—A technical report based on the student's summer work. Emphasis on style, expression, structure and technical understanding. First draft to be submitted to Department Head not later than the second Monday of October. Final draft, typed, due first day of the second term.

395. (1) *Computer Applications in Mining and Mineral Processing.*—Application of computers in the mining industry. [2-0-1; 0-0-0]

410. (1) *Systems Analysis — I.*—Experimentation methodology, where process variables are deliberately and systematically altered. Results are employed to assess the individual and joint effects of factors on such responses as grade and recovery and to develop quantitative descriptions. On-Line optimization procedures are studied with actual plant applications as examples. [2-0-1; 0-0-0]

411. (1) *Systems Analysis — II.*—Techniques of operations research applied to mining operations. Optimal pit and mine design studies. [0-0-0; 2-0-1]

412. (½) *Capital and Operating Cost Estimations.*—Methodology to estimate major equipment costs, capital and operating costs of processing plants. [1-0-0; 0-0-0]

450. (1) *Design Project Synthesis.*—Introduction of a feasibility project and the synthesis of a common mine/plant design problem. [1-0-2; 0-0-0]

451. (2½) *Mine Services.*—Ore handling and storage in open pit and underground mines. Transportation methods. Shaft design and hoisting calculations. Design of mine service and reticulation systems. Mine organization, service departments, climate control, fires, safety and rescue provisions. [3-3-0; 0-0-0]

452. (2) *Mineral Economics and Mine Valuation.*—Ore reserve estimation, mineral economics including mineral supply/demand, policy, cutoff grade, taxation. Mine accounting practices and concepts. Valuation of mineral property and capital budgeting decision criteria. [3-0-2; 0-0-0]

454. (2) *Mine Design, Maintenance and Operation.*—Advanced open pit and underground mining methods and equipment. Selection of mining machinery. Mine planning and design. Equipment maintenance programs. Mine management; use of information systems. Mine support systems. The mine design study is part of a realistic feasibility project selected in MMPE 450. [0-0-0; 2-0-3]

455. (1) *Rock Behaviour.*—The principles of rock behaviour as influenced by surface and subsurface mining; the influence of structural geology, groundwater and blasting on stability in mining; rock bursts; monitoring to assess rock behaviour. Prerequisite: MMPE 356. [2-0-0; 0-0-0]

456. (1) *Rock Mechanics.*—The application of rock mechanics techniques for improvements in safety, efficiency, and operation in open pit and underground mining. [0-0-0; 2-0-0]

457. (1) *Introduction to Rock Mechanics.*—The principles of rock mechanics for surface and underground projects in civil, geological and mining engineering. A course primarily for geological and civil engineers. [2-2*-0; 0-0-0]

460. (2) *Plant Design, Maintenance and Operation.*—Engineering aspects of mineral processing plant design, as part of a realistic feasibility project selected in MMPE 450. Site

selection, layout, flowsheet design. Laboratory studies for equipment selection, sizing and model construction. Infrastructure; maintenance; startup; operating practices. [0-0-0; 2-0-3]

465. (1) *Control of Mineral Processes*.—Application of automatic control to mineral processing. Review of control strategies actually employed for crushing, grinding and flotation circuits. Evaluation of final control elements and primary sensors currently in use. [0-0-0; 2-0-0]

470. (1) *Auxiliary Operations*.—Regulations and environmental protection methods and equipment in mining and mineral processing. [2-0-0; 0-0-0]

471. (1½) *Surface Properties*.—Surfactants and their properties; electrical effects at solid/liquid interfaces; energetics of adsorption, adhesion, wetting; utilization of surface properties in mineral engineering. [2-3-0; 0-0-0]

473. (1) *Coal Mining Technology*.—Occurrence and properties of mineable coal. Surface and underground coal mining methods. Selection of coal mining machinery. Methods of personnel and material transport. Hazards of methane and coal dust. Use of coal mine explosives and electrical equipment. Methane drainage systems. Telemetering and control of mine production, transport and ventilation systems. [0-0-0; 2-0-0]

475. (1½) *Coal Preparation Technology*.—Review of coal classification systems. Fundamentals of washability data. Unit operations and processes relevant to coal preparation, including sizing and selection of corresponding equipment. Plant layouts and typical flowsheets. [2-3*-0; 0-0-0]

480. (2) *Engineering Report*.—Completion of a thesis or engineering report based on summer projects and/or laboratory work under the direction of a staff member. [0-0-1; 0-6-0]

490. (½) *Seminar*.—Oral presentation of a technical nature. Use of closed circuit television for personal evaluation. [0-0-1; 0-0-1]

499. (½) *Field Trip*.—Mark based on the results of field reporting after the field trip scheduled for fourth year students.

550. (1) *Mining Methods*.—A more advanced study of some aspects of mining methods.

551. (1) *Applied Underground Rock Mechanics — Selected Topics*.

552. (1) *Geostatistics Applied to Mining*.—Application of geostatistical techniques to specific mining problems using data obtained from active mining operations.

553. (1-2)**d** *Operations Research*.—Production engineering, linear programming, queuing theory and applications, simulation, reliability theory, game theory, dynamic programming.

554. (1) *Mineral Property Evaluation*.—Identification of variables pertinent to the assessment of mineral properties, the interrelationship and interdependence of such variables; influence of present value criteria, mining taxation, and sources of available finance.

555. (1) *Rock Mechanics in Practice*.—Case examples of investigation of rock and of design and construction in rock including geomechanical engineering problems of evaluation and stabilization.

556. (1) *Rock Slope Engineering*.—Geologic investigations and field and laboratory testing; detailed review of the mechanisms of rock slope instability; the influence of geology, ground water and blasting on rock slope stability; design of stable rock slopes; monitoring of rock slope behaviour; stabilization of rock slope failures.

557. (1) *Underground Stability in Rock*.—Rock classification, geological investigations and in situ and laboratory testing for underground development; stress conditions in rock for various excavation configurations and engineering purposes; excavation techniques; monitoring geomechanics behaviour and stabilization of underground rock failures.

558. (1) *Tunnel Engineering*.—Stress conditions around tunnels at various depths and for various rock conditions; site and laboratory investigations; design of tunnels; support and construction techniques; "cut and cover" methods of construction; tunnelling machines; tunnelling in bad ground; stabilization.

560. (1) *Mine Ventilation*.—Mine air conditioning, ventilation network analysis, radioactivity in mining, case studies in mine ventilation and control of dust, fumes and diesel exhausts.

562. (1) *Equipment Selection*.—Methods of selecting equipment for underground and surface mining. Case studies and applications.

571. (2) *Properties of Interfaces*.—Physical and chemical adsorption at various interfaces; thermodynamic models of adsorption isotherms; surfactants, insoluble monolayers, interactions at interfaces and synergistic effects; electrical effects at interfaces; methods of characterizing surface complexes—reflection spectroscopy, electron diffraction, electroanalysis, interferometry. Applications of: flotation, corrosion, emulsification, detergency, lubrication, adhesion.

572. (1½) *Processing of Mineral Fines*.—Particulate systems. Role of particle size and interfacial phenomena in properties of disperse systems.

573. (1) *Treatment of Mineral Industry Effluents*.—Characteristics of mineral dispersions in gases and in water; dust suppression in mining and in mineral transport facilities; solid-liquid separations; removal of noxious chemicals; waste disposal systems.

574. (2) *Corrosion*.—Modern theories relating to corrosion and corrosion protection of metals. Thermodynamic and kinetic phenomena, corrosion measurements, inhibition and passivation, design for corrosive environments, stress corrosion cracking theory. (Same as METL 558.)

575. (1½) *Mathematical Modelling of Mineral Processes*.—Emphasis on crushing, grinding, screening, classification and flotation.

576. (1½) *Simulation and Optimization of Mineral Processes*.—Mineral process simulators including off-line optimization strategies; optimal flow sheet design.

590. (1-3)**c** *Special Advanced Topics*.—A special advanced course may be arranged upon the approval of the Head of the Department.

596. (0) *Engineering Report*.—An engineering report on a research or design topic under the supervision of a faculty member.

598. (1) *Seminar*.—Presentation and discussion of current topics in mining and mineral process engineering research. Attendance of all students proceeding to graduate degrees in the Department is required during each year of residence.

599. *Thesis*.—For M.A.Sc. degree.—Research studies in mining or mineral process engineering.

699. *Thesis*.—For Ph.D. Degree.

Modern Languages Education (Faculty of Education)

340. (1½) *Using Canadian Literature in the Classroom*.—An examination of Canadian literature, both French and English (in translation), appropriate for use in Canadian schools: methods of using the cultural elements of Canadian literature in school programs. Pre- or co-requisite: 3 units from English 420, 421, 424, 426, 429, or French 414, 415, 416, 417. Taught in French. Credit will be given for only one of English Education 340 and Modern Languages Education 340. [3-0; 0-0] or [0-0; 3-0]

393. (3) *Teaching French in Elementary Schools*.—Strategies, techniques, materials for and administration of Elementary French core programs. Prerequisite: French 202, 220 or approval of advisers in Modern Languages Education. [3-0; 3-0]

394. (3) *Teaching French in French Immersion Schools*.—Strategies, techniques, and materials for and administration of French Language Immersion Programs. Prerequisite: French 202, 220 or approval of advisers in Modern Languages Education. [3-0; 3-0]

396. (1½) *Principles and Practice of French Program Development*.—The development and practice of French Immersion. Program Cadre, and French as a Second Language Programs for preschool, elementary, secondary, or adult groups. Prerequisite: One course in methodology of teaching French and one year of experience in teaching French. [3-0; 0-0] or [0-0; 3-0]

401. (1½) *Curriculum and Instruction in Chinese (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in Chinese, or Director's permission. Co-requisite: Education 499. [3-0; 0-0]

402. (3) *Curriculum and Instruction in French (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in French, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]

403. (1½) *Curriculum and Instruction in German (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in German, or Director's permission. Co-requisite: Education 499. [3-0; 0-0]

404. (1½) *Curriculum and Instruction in Italian (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in Italian, or Director's permission. Co-requisite: Education 499. [3-0; 0-0]

405. (1½) *Curriculum and Instruction in Japanese (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in Japanese, or Director's permission. Co-requisite: Education 499. [3-0; 0-0]

406. (1½) *Curriculum and Instruction in Russian (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in Russian, or Director's permission. Co-requisite: Education 499. [3-0; 0-0]

407. (1½) *Curriculum and Instruction in Spanish (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in Spanish, or Director's permission. Co-requisite: Education 499. [3-0; 0-0]

408. (1½) *Curriculum and Instruction in Modern Languages (Secondary)*.—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in Chinese, German, Italian, Japanese, Russian, or Spanish, or Director's permission. Co-requisite: Education 499. [0-0; 3-0]

480. (1½/3)**c** *Advanced Studies in Language Education*.—Topics will be selected from creative expression, poetry-writing, appreciation, reading, grammar, spelling, and other areas related to French Language Education. Taught in French. Credit will be given for only 3 units of English Education 480 and Modern Languages Education 480. [3-0; 0-0] or [0-0; 3-0] or [3-0; 3-0]

489. (1½) *Applied Linguistics for Teachers of French*.—Pedagogical applications of some descriptions of French. The organization of learning activities based on theories of language acquisition. Prerequisite: French 202 and 220. [3-0; 0-0] or [0-0; 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods*.—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

561. (1½-6)**c** *Laboratory Practicum*.

565. (1½/3)**d** *Special Course in Subject Matter Field*.—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education*.—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences*.—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis*.

Music (Faculty of Arts)

100. (1½) *Theory of Music I*.—Training in musicianship: drills in sight-singing, dictation, improvisation and score-reading. Projects in analysis and composition, focusing on (1) melodic design in modal and tonal styles and (2) two-part modal polyphony. Students with deficiencies in aural perception will be assigned two hours per week of supplementary drill. Students outside the B.Mus. curriculum require permission of the Head, Department of Music. [3-2; 0-0]

101. (1½) *Theory of Music II*.—A continuation of Music 100, with concentration on four-part diatonic-tonal homophony. Prerequisite: Music 100 [0-0; 3-2]

Group Instruction in Music Performance

102. (1) *Class Strings.* [2-0; 2-0]

112. (1) *Class Brasses and Percussion.* [3-0; 3-0]

122. (1) *Class Woodwinds.* [2-0; 2-0]

131. (1) *Class Voice.*—Required of all first-time secondary voice students. [2-3; 2-3]

141. (1) *Class Piano I.* [2-3; 2-3]

241. (1) *Class Piano II.*—Continuation of Music 141. [2-3; 2-3]

103. (1½/3)**d** *Introduction to Music Theory.*—An introduction to music rudiments, musical notation, and the theoretical and formal concepts that have governed the music of western civilization. A basic reading knowledge of music is necessary. This course is not open to Music Majors and is not applicable to the B.Mus. degree or to the Music Major within the B.A. degree. Admission by permission of Department. [3-0; 3-0]

106. (1½/3)**d** *Introduction to Music Composition.*—Projects in music composition as exercises or extended pieces representing various styles and media of performance. Ability to read music and permission of instructor required for admission. Not open to music majors in the B.Mus and B.A. programs. [3-0] or [3-0; 3-0]

107. (1½/3)**d** *Composition I.*—An introduction to musical composition. Prerequisite: permission of the Composition Division based on submission of scores. [3-0; 3-0]

120. (1½) *History of Music I.*—The development of European music from Greek antiquity to *circa* 1300. [3-0; 0-0]

121. (1½) *History of Music II.*—The development of European music from 1300 to 1600. Prerequisite: Music 120. [0-0; 3-0]

135. (1) *Opera Repertoire I.*—A musico-dramatic study and analysis of representative works in the international operatic theatre from 1600 to the present, through musical, literary and graphic sources. Each sequential year of study, the student is expected to show increased facility in musical and dramatic analysis as well as a greater understanding of the works under examination. Open to non-majors by the permission of the instructor. [2-0; 2-0]

136. (1/2)**d** *Piano Repertoire I.*—Performance and discussion of the repertoire for string-keyboard instruments essential to the performer and teacher. Special attention to matters of structure, style, and performance practices. Required of piano performance majors and open to piano concentrators, space permitting. First term prerequisite to second. [3-0; 3-0]

149. (1) *Keyboard Harmony and Transposition.*—Designed for the keyboard performance major and keyboard concentrator in General Music. [0-1; 0-1]

Ensembles.—(Open to non-music majors, after audition.)

150. (1/4)**d** *University Symphony Orchestra.* [0-4; 0-4]

151. (1/4)**d** *University Chamber Orchestra.* [0-4; 0-4]

152. (1/4)**d** *University Wind Ensembles.* [0-4; 0-4]

153. (1/4)**d** *University Singers.* [0-4; 0-4]

154. (1/4)**d** *University Choral Union.* [0-4; 0-4]

155. (1/4)**d** *University Chamber Singers.* [0-4; 0-4]

156. (1/4)**d** *Instrumental Collegium Musicum Ensemble.* [0-4; 0-4]

157. (1/4)**d** *Vocal Collegium Musicum Ensemble.* [0-4; 0-4]

159. (1/4)**d** *University Chamber Strings.* [0-2; 0-1]

160. (1/4)**d** *String Chamber Ensembles.* [0-4; 0-4]

161. (1/4)**d** *Piano Chamber Ensembles.* [0-4; 0-4]

162. (1/4)**d** *Wind and Percussion Chamber Ensembles.* [0-4; 0-4]

163. (1/4)**d** *Contemporary Players.*—Performance of contemporary music. An ensemble of variable size, including both instrumentalists and singers, will be formed to present several concerts of 20th-century music during the academic year. [0-4; 0-4]

164. (1/4)**d** *Stage Band.*— Performance techniques and repertoire of the jazz ensemble. [0-4; 0-4]

165. (1/4)**d** *Asian Music Ensemble.*—Study of Asian music, with training in instrumental techniques and ensemble performance. The music of one major Asian civilization, often Chinese, will be emphasized. Students should consult the instructor for particulars.

Private Instruction in Music Performance, Instrumental and Vocal (See also 571-695)

171. 271. 371. 471. (1) *Music Performance (Secondary).*—Private instruction, vocal or instrumental. [0-½; 0-½]

181. 281. 381. 481. (1) *Music Performance (Concentration).*—Private instruction, vocal or instrumental. [0-½; 0-½]

191. 291. 391. 491. (1) *Music Performance (Major).*—Private instruction, vocal or instrumental. [0-½; 0-½]

172. 272. 372. 472. (2) *Music Performance (Secondary).*—Private instruction, vocal or instrumental. [0-1; 0-1]

182. 282. 382. 482. (2) *Music Performance (Concentration).*—Private instruction, vocal or instrumental. [0-1; 0-1]

192. 292. 392. 492. (2) *Music Performance (Major).*—Private instruction, vocal or instrumental. [0-1; 0-1]

173. 273. 373. 473. (3) *Music Performance (Secondary).*—Private instruction, vocal or instrumental. [0-1½; 0-1½]

183. 283. 383. 483. (3) *Music Performance (Concentration).*—Private instruction, vocal or instrumental. [0-1½; 0-1½]

184. 284. 384. 484. (4) *Music Performance (Concentration).*—Private instruction, vocal or instrumental. [0-1½; 0-1½]

193. 293. 393. 493. (3) *Music Performance (Major).*—Private instruction, vocal or instrumental. [0-1½; 0-1½]

194. 294. 394. 494. (4) *Music Performance (Major).*—Private instruction, vocal or instrumental. [0-1½; 0-1½]

195. 295. 395. 495. (5) *Music Performance (Major).*—Private instruction, vocal or instrumental. [0-1½; 0-1½]

200. (1½) *Theory of Music III.*— Continuation of Music 101. Projects in analysis and composition, focusing on 18th-century harmonic and contrapuntal practice. Detailed study of short works representing common tonal forms. Prerequisite: Music 101. [3-2; 0-0]

201. (1½) *Theory of Music IV.*—Continuation of Music 200. Projects in analysis and composition, focusing on elementary chromatic harmony, encompassing the vocabulary of the late 18th century and the early 19th. Prerequisite: Music 200. [0-0; 3-2]

207. (1½/3)**c** *Composition II.*—Continuation of Music 107. Prerequisite: Completion of Music 107 and permission of Composition Division based on submission of scores. First term prerequisite to second. [3-0; 3-0]

220. (1½) *History of Music III.*—The development of European music from *circa* 1600 to *circa* 1800. Prerequisite: Music 121. [2-1; 0-0]

221. (1½) *History of Music IV.*—The development of European music, and its offshoots in the Americas, from *circa* 1800 to the present. Prerequisite: Music 220. [0-0; 2-1]

233. (1) *Accompanying on the Harpsichord I.*—Basic techniques and styles of continuo playing. Open to keyboard players with no previous harpsichord experience. Prerequisite: Music 149 or permission of instructor. [0-2; 0-2]

235. (1) *Opera Repertoire II.*—See Music 135.

236. (1/2)**d** *Piano Repertoire II.*—Continuation of Music 136. [3-0; 3-0]

249. (1) *Keyboard Accompanying I.*—Accompanying on the piano or organ. [0-1; 0-1]

300. (1½) *Theory of Music V.*—Continuation of Music 201. Continued study of works representing common formal types. Projects in analysis and composition, involving chromaticism in the period 1850-1920. Prerequisite: Music 201. [3-0; 0-0]

301. (1½) *Theory of Music VI.*—Continuation of Music 300. Projects in analysis and composition, involving twentieth-century music which is not conventionally tonal. Prerequsite: Music 300. [0-0; 3-0]

305. (1) *Readings in Orchestral Repertoire.*—A laboratory course designed primarily for orchestral wind and percussion performance majors. Emphasis on reading a large cross-section of standard orchestral repertoire with further emphasis given to music currently being programmed by local professional orchestras. [0-1; 0-1]

306. (2) *Choral and Instrumental Conducting.*—Choral and instrumental conducting techniques and practices. This course carries credit only for majors in Music. [2-0; 2-0]

307. (1½/3)**c** *Composition III.*—Continuation of Music 207. Prerequisite: Completion of Music 207 and permission of Composition Division based on submission of scores. [3-0; 3-0]

309. (1/2)**d** *Orchestration and Arranging.*—Orchestration and arranging for all instrumental and, where possible, vocal ensembles. (Laboratory fee of $25 in addition to normal fees.) [2-0; 2-0]

321. (1½/3)**d** *Music Appreciation, Twentieth-Century.*—Designed for students with little or no musical background. Not open to majors in Music. [3-0; 3-0]

324. (1½) *Music and Civilization I.*—Development of music in relation to the other arts, science, philosophy, literature and history: Ancient Greece, the Middle Ages, and the Renaissance. Designed for students not proceeding to the B.Mus. [3-0; 0-0]

325. (1½) *Music and Civilization II.*—A continuation of Music 324, dealing with Europe after 1600. Designed for students not proceeding toward the B.Mus. [0-0; 3-0]

326. (1½/3)**d** *Music Appreciation.*—An introductory course for which previous musical background is helpful, but not required. Contents include a discussion of musical concepts, evolution of forms, style, and media and detailed study of selected works from the concert repertoire. Popular forms of music (jazz, folk, rock, etc.) not included. Not open to majors in Music for credit. [3-0; 3-0]

327. (1½/3)**d** *Liturgical Music I.*—Music of the Eastern and Western liturgies from earliest times to the Reformation. Prerequisite: Music 121.

328. (1½/3)**d** *World Music Cultures.*—An ethnomusicological introduction to the traditional and folk music cultures of the world. The cultures to be surveyed will normally be those of Asia, the Pacific, the Near East, and the Americas, although the emphasis may vary from year to year. Open to non-music majors with third-year standing. Prerequisite: Music 101.

333. (1) *Accompanying on the Harpsichord II.*—Continuation of Music 233 with emphasis on more advanced continuo and obbligato techniques. Prerequisite: Music 233. [0-2; 0-2]

335. (1) *Opera Repertoire III.*—See Music 135.

336. (1½/3)**d** *Opera Theatre Techniques.*—Designed to meet the needs of singers in opera and lyric theatre. Stage techniques associated with the musical theatre of various historical periods, and as conditioned by structural elements of music. [3-1; 3-1]

339. (1½/3)**d** *Opera Workshop I.*—Actual participation in performances by the Department. Open also to students outside Music without credit, after audition. [2-3; 2-3]

343. (1) *Class Piano III.*—Class instruction designed to fulfil the needs of the music student requiring extra work in transposition, score-reading, keyboard harmonization and improvisation, taken in lieu of Music 344. Open to any student other than keyboard majors or concentrators who has successfully completed two years of individual or class piano instruction. [0-1; 0-1]

349. (1) *Keyboard Accompanying II.*—Continuation of Music 249. [0-1; 0-1]

350. (1½/3)**d** *Early Christian and Medieval Music.*—Early notations and musical developments from early Christian times to 1400. Prerequisite: Music 121. [3-0] or [3-0; 3-0]

352. (1½) *Late Medieval and Early Renaissance Music.*—Sacred and secular music, vocal and instrumental. Prerequisite: Music 121. [3-0]

353. (1½) *Renaissance Music from 1500 to 1620.*—Sacred and secular music, vocal and instrumental. Prerequisite: Music 121. [3-0]

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354. (1½) *Baroque Music*.—Prerequisite: Music 220. [3-0]
355. (1½) *Classical Music*.—Prerequisite: Music 220. [3-0]
356. (1½) *Romantic Music*.—Prerequisite: Music 221 [3-0]
357. (1½) *Twentieth-Century Music*.—Prerequisite: Music 221. [3-0]
400. (1½/3)**d** *Theory of Music VII*.—An introduction to advanced work in analysis. Emphasis on the detailed study of individual works with a view to understanding these in the light of particular theories of musical structure and as exemplifying stylistic norms. Prerequisites: Music 301 and 221. [3-0] or [3-0; 3-0]
402. (1½/3)**c** *Special Projects*.—For fourth-year students who receive permission of the Head of the Department of Music to do advanced studies in their major field. [0-3; 0-3]
403. (1½/3)**d** *Selected Topics in Music*.—See Department of Music schedule for description and prerequisites.
406. (1/2)**d** *Conducting II*.—Advanced choral and orchestral conducting techniques and rehearsal practices. Prerequisite: Music 306. [2-0; 2-0]
407. (1½/3)**c** *Composition IV*.—Continuation of Music 307. First term prerequisite to second. [3-0; 3-0]
427. (1½/3)**d** *Liturgical Music II*.—Music of the Western liturgies from the Reformation to the present day, including a study of hymnology. Prerequisite: Music 221.
428. (1½/3)**d** *Area Studies in Ethnic Musics*.—The history, theory, style, organology, and forms of the music of a particular culture in its aesthetic and cultural context, e.g. music of China, or Japan, or Korea, or Indonesia, or Middle East. Open to advanced undergraduates. Students should consult the department as to which music culture will be covered in a particular year. Prerequisite: Music 328.
435. (1) *Opera Repertoire IV*.—See Music 135.
439. (1½/3)**d** *Opera Workshop II*.—A continuation of Music 339. [2-3; 2-3]
440. (1) *Piano Teaching Methods and Materials*. [0-0; 2-0]
441. (1) *Vocal Techniques*.—A study of the scientific principles related to vocal performance: acoustical, physiological and psychological. [2-0; 1-1]
442. (1/2)**d** *Song Interpretation and Accompaniment*.—Survey of the literature for voice with keyboard accompaniment, with emphasis on performance problems. Open to piano and voice majors, and to others by permission of instructor. [0-2; 0-2]
449. (3) *Graduating Essay*.
450. (1½) *History of Symphonic Music*.—Prerequisite: Music 221. [3-0]
451. (1½) *History of Chamber Music*.—Prerequisite: Music 221. [3-0]
452. (1½/3)**d** *History of Keyboard Music I*.—The development of keyboard music from 1300 to 1800. Prerequisite: Music 220. [3-0]
453. (1½) *History of Keyboard Music II*.—The development of keyboard music from 1800 to the present. Prerequisite: Music 221. [3-0]
454. (1½) *History of Opera I*.—The development of opera between 1600 and 1800. Prerequisite: Music 220. [3-0]
455. (1½) *History of Opera II*.—The development of opera between 1800 and the present. Prerequisite: Music 221. [3-0]
456. (1½) *History of Solo Song*.—Prerequisite: Music 221. [3-0]
457. (1½) *History of Choral Music*.—Prerequisite: Music 221. [3-0]
500. (1½/3)**d** *Seminar in Analytical Techniques*.—Prerequisite: Music 400.
501. (1½) *Tonal Analysis in the Twentieth Century I*.—Exercises and selected readings in Schenkerian analysis. Prerequisite: Music 400 or permission of instructor.
502. (1½) *Tonal Analysis in the Twentieth Century II*.—Studies in a variety of modern approaches to the analysis of tonal music. Prerequisite: Music 400 or permission of the instructor.
503. (1½/3)**d** *Topics in the History of Music Theory*.—Practical and speculative topics in the development of music theory within the Western tradition. Theoretical works considered in their relations to one another, to musical practice, and to the history of ideas. Students should consult the department as to the areas of focus in any given term. [3-0; 3-0]
504. (1½/3)**d** *Theoretical Studies in Twentieth-Century Music*.—Studies in the theoretical literature pertaining to twentieth-century music, and analysis of representative scores.
505. (1½/3)**d** *Instructional Goals and Methods in Basic Music Theory*.—Critical evaluation of goals and methods of training in music theory, and review of pertinent selected materials. Individual projects and practical exercises. Pre-requisite: MUSC 400 or permission of the instructor.
507. (1½/3)**c** *Composition*.—The composition of original music for conventional instruments and/or electronic media.
508. (1½/3)**c** *Composition*.—A continuation of Music 507. Prerequisite: Music 507 or equivalent.
509. (1½-3)**c** *Advanced Orchestration and Arranging*.
512. (1½/3)**c** *Directed Individual Studies*.—Approval by the Head, Department of Music, is required.
520. (1½/3)**d** *Music Bibliography and Research Techniques*.—Introduction to the principal resources of the research library, with particular attention to reference tools and bibliographical repertoires.
521. (1½/3)**d** *Seminar in Performance Practices*.—Studies in the theoretical and practical problems of musical interpretation.
522. (1½/3)**d** *Seminar in Notation of Polyphonic Music*.
523. (1½/3)**d** *Seminar in Medieval Music*.
524. (1½/3)**d** *Seminar in Renaissance Music*.
525. (1½/3)**d** *Seminar in Baroque Music*.
526. (1½/3)**d** *Seminar in Classical Period Music*.
527. (1½/3)**d** *Seminar in Nineteenth-Century Music*.
528. (1½/3)**d** *Seminar in the Literature of Music*.—Students in graduate programs involving performance will be given special projects related to the history, bibliography, repertoire and teaching problems in each area. A paper will be required. Prerequisites: Music 301, 221; Music 520 (May be taken concurrently).
529. (1½/3)**d** *Introduction to Ethnomusicology*.—Preliminary studies in the discipline of ethnomusicology, its sources, resources, and research techniques. Graduate standing required.
530. (1½/3)**d** *Seminar in Twentieth-Century Music*. [3-0; 3-0]
531. (1½/3)**d** *Seminar in Ethnomusicology*.—Research studies in selected areas or regions of world music cultures. Prerequisite: Music 529. [3-0; 3-0]
532. (1½/3)**d** *Advanced Studies in Music History and Musicology*.
538. (1½/3)**d** *Staging and Directing Opera*.—Pre-requisite: Permission of instructor.
539. (3) *Opera Production*.—Stylistic and technical studies and participation in the production of opera performances. Prerequisite: Music 439. [0-9; 0-9]
549. (3/6) *Master's Thesis*.

The following ensembles are available only to graduate students.

550. (1) *University Symphony Orchestra*.
551. (1) *University Chamber Orchestra*.
552. (1) *University Wind Ensembles*.
553. (1) *University Singers*.
554. (1) *University Choral Union*.
555. (1) *University Chamber Singers*.
556. (1) *Collegium Musicum Ensembles*.
559. (1) *University Chamber Strings*.
560. (1) *String Chamber Ensembles*.
561. (1) *Piano Chamber Ensembles*.
562. (1) *Wind and Percussion Chamber Ensembles*.
563. (1) *Contemporary Players*.
564. (1) *Stage Band*.
565. (1) *Asian Music Ensemble*.—Study of Asian music, to include practical training in instrumental techniques and ensemble performance. The music of one major Asian civilization, often Chinese, will be emphasized.
571. 671. (1) *Music Performance (Secondary)*.—Private instruction, vocal or instrumental. [0-½; 0-½]
591. 691. (1) *Music Performance (Major)*.—Private instruction, vocal or instrumental. [0-½; 0-½]
572. 672. (2) *Music Performance (Secondary)*.—Private instruction, vocal or instrumental. [0-1; 0-1]
592. 692. (2) *Music Performance (Major)*.—Private instruction, vocal or instrumental. [0-1; 0-1]
573. 673. (3) *Music Performance (Secondary)*.—Private instruction, vocal or instrumental. [0-1½; 0-1½]
593. 693. (3) *Music Performance (Major)*.—Private instruction, vocal or instrumental. [0-1½; 0-1½]
594. 694. (4) *Music Performance (Major)*.—Private instruction, vocal or instrumental. [0-1½; 0-1½]
595. 695. (5) *Music Performance (Major)*.—Private instruction, vocal or instrumental. [0-1½; 0-1½]
607. (1½/3)**c** *Composition*.—Further study for doctoral candidates in Composition.
649. *Ph.D. or D.M.A. Thesis*.

Music Education (Faculty of Education)

**Additional fees are charged for these courses. See "Special Fees" P. 22.

101. (3) *Elementary Theory*.—Fundamentals of musicianship. Students must obtain at least a second class standing in this course to be considered for a music concentration or major. [3-2; 3-2]
102. (3) *History of Music*.—History of music with emphasis upon the cultural development of mankind through the ages. Appreciation and understanding will be encouraged through illustration and discussion of major works. [3-0; 3-0]
103. (1) *Introduction to the Kodaly Method*.—Development of knowledge and skills necessary for implementing Kodaly Method in secondary music education; teaching strategies, curriculum design and relevant professional literature. [0-0; 0-2]
104. (1) *Classroom Melody Instruments*.—Development of class methods and materials, arranging and playing skills for recorder consort, melodian-type instruments and pitched percussion. [0-2; 0-0] or [0-0; 0-2]
105. (1) *Classroom Accompanying Instruments*.—Development of class methods and materials, arranging and playing skills for guitar, baritone ukulele, autoharp, and piano. [0-0; 0-2] or [0-2; 0-0]
201. (3) *Counterpoint and Harmony*.—A continuation and expansion of Music Education 101. Students must obtain at least a second-class standing in Music Education 201 to continue in the Music concentration or major. Prerequisite: Music Education 101. [3-2; 3-2]

302. (2/3)d** *Instrumental Techniques.*—Instruction in the playing and teaching techniques of strings, brasses and woodwinds. Prerequisite: Music Education 201 or Music 200. [2-0; 2-0] or [3-0; 3-0]

303. (2/3)**d** *Choral Music.*—Principles and techniques of choral music. Prerequisite: Music Education 201 or Music 200. [2-0; 2-0] or [3-0; 3-0]

307. (3) *Music Education.*—A study of modern methods, materials, objectives, and philosophy pertaining to the teaching of music in elementary schools. Prerequisite: Music Education 324. [3-0; 3-0]

321. (3) *Microcomputers in Art and Music Education.*—The application of computers as creative instruments in art and music with emphasis on strategies for integrating art and music activities and on pattern making and pattern manipulation. (Same course as Art Education 321). [1-4; 1-4]

**324. (1) *Curriculum and Instruction in Music.*—A study of (a) the curriculum organization in music for the elementary grades; (b) techniques of instruction in music for these grades. [2-0; 2-0]

332. (1½) *Instrumental Jazz Pedagogy.*—Teaching instrumental jazz in the secondary school. [3-0; 0-0] or [0-0; 3-0]

333. (1½) *Choral Jazz Pedagogy.*—Teaching choral jazz in the schools. [3-0; 0-0] or [0-0; 3-0]

340. (1½) *Canadian Music in the Classroom.*—Aspects of Canadian music suitable for elementary and secondary school curricula. The interrelation between music and other subjects. [3-0; 0-0] or [0-0; 3-0]

400. (1) *Method Studies in Music Education.*—Intensive study of a major methodology such as Orff, Kodaly, Education Through Music, Manhattanville Music Curriculum Project. May be repeated, for a maximum of 3 units. [0-2; 0-0] or [0-0; 0-2]

401. (3) *Orchestration and Arranging.*—Techniques of writing and arranging for chorus, band and orchestra. Pre- or co-requisite: Music Education 302. [3-0; 3-0]

402. (3) *Music Curricula in the Public Schools.*—Lectures, discussions, demonstrations and observations of the music curricula in the public schools; application of procedures. For selected students in Music Education. [2-1; 2-1]

**404. (3) *Curriculum and Instruction in Music (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in music, or Director's permission. Co-requisite: Education 499. [3-0; 3-0]

405. (3) *Electronic Music in the Classroom.*—Current practice in individual and classroom use of tape recording technique (Musique Concrete) and electronic synthesizers. Prerequisite: Music Education 201.

412. (1½) *Music Education for Handicapped Children.*—The practice and theory of music as used for the education of the handicapped child. Prerequisite: Special Education 312. [3-0; 0-0] or [0-0; 3-0]

508. (1½/6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

542. (3) *Theory and Principles of Music Education.*—Supervision and administration of music education. Individual projects in special interest areas. Prerequisite: a major in Music Education.

561. (1½-6)**c** *Laboratory Practicum.*

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

601. (1½-6)**d** *Doctoral Seminar.*

699. *Doctoral Thesis.*

Naval Architecture (Faculty of Applied Science) (See Mechanical Engineering 440 and 441)

Neuroscience (Faculty of Graduate Studies)

549. (6) *Master's Thesis.*

649. *Ph.D. Thesis.*

Nursing (School of Nursing, Faculty of Applied Science)

**Additional fees are charged for these courses. See "Special Fees" P. 22.

In the clinical nursing courses the ratio between class and supervised nursing experience varies but in the overall program it is approximately 1:3. The unit values for these courses are based on both instruction and supervised nursing experience.

**101. (4) *Introduction to Nursing.*—An introduction to the use of the nursing process in assessment of well people at all stages throughout the life cycle, in identification of potential and actual problems and in the development of skills necessary to assist with activities of daily living. [2-6; 2-6]

**201. (8) *Nursing Care I.*—A study of concepts, skills and processes basic to the practice of nursing with application to patients in selected clinical settings. Emphasis is on the care of ill adults. Prerequisite: Nursing 101. [4-12; 4-12]

**301. (4) *Nursing Care II.*—Study and application of concepts skills and processes basic to the practice of nursing. Emphasis is on the care of families with newborn infants and young children. Prerequisite: Nursing 201. [4-12; 0-0]

**302. (4) *The Process of Nursing.*—An exploration and application of concepts, skills and processes basic to the nursing process. Students build upon previously acquired knowledge and skills in selected clinical settings. *Note:* Registered Nurse Students only. [4-12; 0-0]

303. (3) *Family Nursing Care.*—A study of the concepts, skills and processes basic to providing nursing care to families. Content will include the study of family structure, interaction, health behaviors and family-community interplay. Prerequisite: Nursing 301 or Nursing 302. [0-0; 3-9]

304. (1½) *Introduction to Nursing Research.*—A study of the research process and application of research findings to nursing. Prerequisite: Statistics 203. [0-0; 3-0]

305. (1½) *Professional Issues I.*—A study of social, legal and ethical issues pertinent to the practice of nursing. Content will include consideration of roles within the profession, and of expanded and extended roles in nursing. [0-0; 2-1]

**403. (6) *Advanced Nursing Care.*—The study of an increasing number of variables in the nursing care of individuals and families. Emphasis is on the maintenance and promotion of health for patients with long term illness. Prerequisite: Nursing 303. [3-9; 3-9]

405. (1½) *Professional Issues II.*—A study of the nursing profession within the context of the Canadian health care system and Canadian society. Emphasis is on the nursing profession as it relates to government at all levels, on past, current and future trends within the profession, and on educational and practice issues and concerns to the nursing profession. Prerequisite: Nursing 305. [2-1; 0-0]

406. (1½) *Management of Nursing Care.*—A study of theories, principles and skills related to planned change, management and leadership as they affect the provision of nursing care. Prerequisites: Nursing 303 and 426. [0-0; 2-2]

408. (3) *Guided Study in Nursing.*—A course of study which enables the student to contract for pursuit of an area of particular interest in nursing. To be designed in consultation with a faculty member with expertise in the chosen area. Prerequisites: Nursing 303 and 304. It is strongly recommended that Nursing 403 be taken prior to or concurrently with Nursing 408. [3-0; 3-0]

409. (3) *Clinical Nursing Elective.*—This course provides students with an opportunity to increase knowledge and skills in an identified area of clinical interest pertaining to nursing. Students work under the guidance of faculty with specific expertise in the area. [3-0; 3-0]

426. (3) *Health Care and Epidemiology.*—The application of epidemiological methods to the prevention and control of disease, the promotion of health and the development of health care programs in the community. Open to all Health Science students with permission of the instructor. [3-0; 3-0]

510. (1½) *Theory Development in Nursing.*—Study of theory development in nursing: history, inductive and deductive methods, implications for professional nursing. Must be taken prior to or concurrently with Nursing 522. [3-0; 0-0]

522. (2) *Nursing Research.*—Study of the research process and its relationship to theory development in nursing. [2-0; 2-0]

542. (4) *Selected Concepts in Clinical Nursing.*—Detailed examination of major concepts and related theories with application in clinical nursing practice. Opportunities will be provided for application of content in each student's area of clinical interest. Must be taken concurrently with or following Nursing 510. [2-6; 2-6]

546. (1½) *Nursing and the Delivery of Health Care.*—Study of the reciprocal relationship between nursing and the delivery of health care in Canada including structure and process of health care delivery, social policy affecting health care, consumerism, bureaucratic influences, process of change. [0-0; 3-0]

548. (1½) *Clinical Specialization I.*—Study of the role of the clinical specialist and its development within various health care systems. Identification of the theory and skills fundamental to the student's clinical speciality. Examination of the relationship of clinical specialization to nursing research. Prerequisite: Nursing 510. [0-0; 3-0]

564. (3) *Curriculum Development in Nursing.*—Study of curriculum-development as it applies to nursing education. Prerequisite: Nursing 510. [0-0; 6-0]

574. (3/6)**c** *Administration in Nursing.*—Exploration of concepts and principles of organizational behavior, management methods and administrative processes and their application to nursing service and education settings. A practicum is required for students taking the course for 6 units. Prerequisites: Nursing 510, 522, 542, 546. Required support courses Commerce 323, 520 or one of the 500 level Commerce courses. [3-0; 3-0] or [3-9; 3-9]

580. (3) *Teaching in Clinical Nursing.*—Study of instructional design and its implementation in a variety of educational settings in nursing. A practicum is required. Prerequisite: Nursing 564. [2-3; 2-3]

588. (6) *Clinical Specialization II.*—Directed study in clinical nursing. Focus of study determined by student, dependent upon faculty and clinical resources. Prerequisite: Nursing 548. [2-12; 2-12]

590. (1½/3)**c** *Directed Studies in Nursing.*

597. (1½) *Graduate Seminar in Professional Nursing.*—Analysis of the processes and attitudes essential to the promotion of quality nursing care. Opportunities will be provided for application of content in each of the functional areas. Prerequisite: Nursing 510, 542, 546. [1½-0; 1½-0]

599. (3) *Master's Thesis.*

Proof

Obstetrics and Gynaecology (Faculty of Medicine)

425. *Introduction to Obstetrics*.—A course of lectures encompassing anatomy and physiology of the reproductive tract, fertilization, implantation and development of the embryo and placenta, maternal and fetal physiology.

450. *Principles of Obstetrics and Gynaecology*.—Obstetrics: series of lectures covering the field of normal and abnormal obstetrics. During two of the four quarters, small group seminars as well as out-patient and ward instruction are conducted. Gynaecology: A series of lectures which deal with the most common gynaecological disorders. Teaching and demonstrations to small groups of students supplement the didactic work.

475. *Principles of Obstetrics and Gynaecology*.—Obstetrics: clinical clerkship of eight weeks provides an experience in two different types of hospitals while working in close association with more senior colleagues. There is an opportunity to acquire experience and judgment in the delivery of ante-, intra-, and post-partum care. Patient care duties are assigned which are complemented by scheduled rounds and seminars. Gynaecology: During the eight weeks clinical clerkship responsibilities are assigned in both the gynaecology outpatient and inpatient services. There is an opportunity to see common problems in ambulatory care as well as in surgical gynaecology. Patient care responsibilities are assigned which are complemented by scheduled rounds and seminars

501. (1½) *Reproductive Endocrinology I*.—Neuroendocrine regulation of reproduction, regulation of the ovarian and testicular function.

502. (1½) *Physiology of the Mother, Fetus and Newborn*.—Functional development of the placenta and major organ systems in the fetal and newborn period in man and animals.

503. (1½) *Fetal and Perinatal Metabolism*.—Nutrient supply from the mother via the placenta and the milk.

504. (1½) *Reproductive Endocrinology II*.—Lectures and seminars on cellular processes in hormone secretion, steroid biosynthesis, steroid transport and metabolism, mechanism of hormone action, prostaglandins in reproduction. Prerequisite: OBST 501.

505. (3) *Experimental Techniques in Reproductive Biology*.—Laboratory course on: cell and organ cultures, radioimmunoassay of steroid and protein hormones and prostaglandins, *in vitro* fertilization, neuroendocrine techniques, techniques to study fetuses, techniques for metabolic studies in newborn animals

506. (1½) *Seminars in Reproductive Biology*.

549. (6) *M.Sc. Thesis*.

649. *Ph.D. Thesis*.

700. *Grand Rounds*.—Weekly presentation of case histories of current interest with discussion of the clinical problem and relevant literature. At these rounds, reports of clinical research studies are presented and outside guest speakers may present papers. One hour weekly.

701. *Seminar Series in Obstetrics and Gynaecology*.—A weekly two-hourly session, with consideration at a postgraduate level of appropriate topics in gynaecology and obstetrics and in those areas that interface with other disciplines.

702. *Clinical Genetics Clinic*.—A rotation three days per week for three months through the Clinical Genetics Clinic dealing with the techniques of the prenatal diagnosis of genetic disease and genetic counselling relative to congenital malformations and failures of reproduction.

704. *Human Sexuality*.—Clinical experience in the University Sex Therapy Unit in the Department of Psychiatry. Instruction in interviewing, assessment, and treatment of individuals and couples with problems in sexual function. Part-time rotation two days per week for three month period.

709. *Intensive Care Seminar*.—Devoted to the problems and possible pitfalls of maternal and neonatal management, selected from a group of current clinical problems in the Intensive Care Nursery. Emphasis is given to the possible neonatal consequences of maternal management and to special considerations which should be communicated to the Obstetrician in advance of the time of labour. The importance of differences in management according to the specialization of facilities is stressed. One hour weekly.

712. *Perinatal Mortality Conference*.—Discussion of perinatal mortality cases for the month, with review of clinical and laboratory findings, management and pathology findings by paediatric, obstetrical and pathology teaching staff. Methods of possible prevention of fetal or neonatal death are discussed and recommended as hypothetical reasons for preventability, where appropriate. Two hours monthly.

778. *Gynaecological Oncology Rounds*.—Case presentation and discussion of current patients on the gynaecology oncology service — weekly one hour conjoint rounds of the C.C.A.B.C. radiotherapy staff and gynaecologists active in gynaecological oncology.

Oceanography (Faculty of Science)

308. (1½) *Introduction to Oceanography I*.—History and development of oceanography; methods; ocean basin structure; properties of seawater; salinity, temperature and density distributions; circulation; waves and tides; acoustics; the oceans and climate. Prerequisite: completion of First Year Science. [3-0; 0-0]

309. (1½) *Introduction to Oceanography II*.—Biological oceanography; phytoplankton; zooplankton; benthos; fisheries and aquaculture; marine sediments; marine resources; pollution of the sea. Prerequisite: Oceanography 308 or permission of the Head of the Department. Credit may be obtained for only one of Oceanography 309 and 316. [0-0; 3-0]

310. (3) *Man and the Oceans*.—An introduction to the oceans for non-science students. The course provides a comprehensive review of oceanography, dealing with basic topics, including the motion and composition of ocean waters, life in the sea, the age and composition of the sea floor, and a history of the exploration of the oceans and its impact on Man's culture. Applied aspects, such as: food from the sea; mineral and oil exploitation; pollution; navigation; military uses and the law of the sea, are also included. Not open to students in the Faculties of Science and Applied Science. [3-0; 3-0]

316. (1½) *Introduction to Biological Oceanography*.—An introduction to descriptive biological oceanography, covering the plankton community and its relation to the physical/chemical environment of the sea. The practical importance of biological oceanography to fisheries management and pollution problems will be emphasized. Prerequisite: Third year standing required. Corequisite: Biology 321 or permission of Head of Department, (Zoology 316/Oceanography 316 are the same course). [2-0-1; 0-0-0]

401. (1½) *Introduction to Dynamic Oceanography*.—Ocean physics; static stability and convection; dynamics of ocean currents; turbulent diffusion; estuarine circulation; eddies and gyres; waves and tides. Prerequisites: Oceanography 308, Mathematics 255 or 315. Credit may be obtained for only one of Oceanography 401 and 405. [0-0; 3-0]

405. (1½) *Elements of Dynamic Oceanography*.—Physical properties of sea water, hydrostatics, continuity, geostrophic and wind-driven currents, waves and tides. Prerequisite: Oceanography 308. Students with strong backgrounds in Physical Sciences or Mathematics should take Oceanography 401. Credit may be obtained for only one of Oceanography 401 and 405. [3-0; 0-0]

406. (1½) *Aquatic Ecology II*.—Analytical techiques and field operations as used in biological oceanography. Pre- or co-requisite: Oceanography/Zoology 316, or permission of Head of Department. Zoology 406/Oceanography 406 are the same course. [0-0-0; 1-4-1]

407. (1½) *Introduction to Marine Chemistry and Geochemistry*.—Elemental abundance in seawater and marine sediments; solution chemistry of seawater; chemical and mineralogical composition of sediments; the carbonate system; organic matter in the sea; gases; the nutrient elements; heavy metals; geochemical balance in the oceans. Prerequisite: One of Oceanography 308, 316 or Chemistry 301. [0-0; 3-0]

408. (1½) *Oceanographic Methods*.—Oceanographic instrumentation, methods of study and the analysis of oceanographic data. A field trip may be required. Prerequisite: Oceanography 308. Open only to 4th year students in Oceanography, or with permission of the head of the Department [0-0; 3-0]

409. (1) *Waves and Tides*.—A review of observations on, and of the physics of the various kinds of oceanic waves, including tides, and their effects on coastal features. Corequisite: Oceanography 401 or 405. [0-0; 2-0]

410. (1½) *Marine Pollution*.—An interdisciplinary study of pollution, with examples drawn from coastal and oceanic environments, including areas of local interest. Intended for third and fourth year students with a background in the sciences. [2-0-1; 0-0-0]

412. (1) *Marine Microbiology*.—An introduction to the diversity and activities of bacteria, yeasts, and filamentous fungi in coastal and oceanic ecosystems. Emphasis will be given to the roles of these microbes in nutrient cycling and as symbionts of marine organisms. Given second term. Prerequisites: Microbiology 200 or permission of Head of Department. [0-0; 2-0]

413. (1) *Estuaries*.—An interdisciplinary study of the features and the physical, chemical, biological and geological processes in estuaries. Prerequisites: Oceanography 308, 309 and fourth year standing or permission of the Head of the Department. [2-0; 0-0]

415. (1½) *Algal Physiology*.—Environmental physiology of marine algae with emphasis on physiological adaptations to environmental factors. Laboratory features culturing of algae and analytical techniques useful in measuring physiological response to environmental changes. Prerequisites: Botany 301 and one of Botany 330, Biology 330 or Biology 201 (may be taken concurrently). Same as Botany 415. [0-0; 2-3]

416. (1½) *History of the Ocean Basins*.—Development of ocean basins over geological time; paleoceanography and paleoclimatology. Prerequisite: Geology 426 or permission of Head of Department. [0-0; 3-0]

448. (1-3)c *Directed Studies*.—A course to allow students to study a specific topic as agreed upon by a faculty member and student with written permission of the Head of Department.

449. (3) *Oceanographic Research*.—Directed investigation based on field or laboratory studies requiring a written scientific report and final oral examination. For Honours students only.

501. (1) *Seminar in Synoptic Oceanography*.—The ocean water masses with emphasis on specific and recent studies. Prerequisites: Oceanography 308, and Oceanography 401, 405, or 514. Given second term usually in alternate years.

502. (1) *Marine Chemistry*.—The speciation and distribution of the chemical elements in the oceans, the physico-chemical properties of seawater, the geochemical cycles and marine chemistry of selected constituents. Given first term.

503. (1) *Oceanographic Methods*.—Oceanographic instrumentation, design of experiments, processing and analysis of data. (For graduate students in Oceanography planning field programs.) Prerequisites: Oceanography 308, and Oceanography 401, 405 or 514.

504. (1) *Organic Chemicals in the Marine Environment*.—The role of organic substances in the ocean. Detailed consideration of man-made pollutants and naturally occurring materials. Chemistry of the compounds and their synthesis by organisms or by industry. Chemical lability of the compounds and their environmental degradation. Ecological impact, oceanographic distribution and potential use of organic substances as oceanographic tracers. Trace metal organic interactions.

505. (1-3)c *Special Advanced Courses*.—A special advanced course may be arranged for a student upon approval of the Head of the Department.

506. (1½) *Marine Phytoplankton Ecology*.—Emphasis on the biology of the organisms and the physiological ecology of primary production by phytoplankton. Oceanography 308 and 309 or 316 are recommended. Offered in alternate years.

507. (1) *Zooplankton Ecology*.—A study of marine zooplankton, the interrelationships of the species, their biology and relations to the environment. Prerequisite: Oceanography 308. Given in alternate years.

509. (1) *Biological Oceanographic Mechanisms*.—A study of components in the pelagic food

chain of the sea including factors affecting the production and consumption of marine organisms. Prerequisite: Oceanography 308.

510. (1) *Seminar in Dynamic Oceanography*.—A review of selected papers on the circulations of the oceans. Prerequisite: Oceanography 514.

512. (1) *Inorganic Chemical Processes in the Marine Environment*.—The solution chemistry of seawater, sorption processes and surface chemistry, radioactivity in the marine environment, the modelling of marine chemical systems.

513. (½-1)c *Seminar in Biological Oceanography*.—A course to allow students the opportunity to present their own work, or that of others, orally. Topics will be chosen in consultation with faculty. Students will be expected to present at least one seminar during the term and to participate in the discussion of other seminars. Students in biological oceanography will normally take the seminar twice during their tenure at U.B.C.

514. (2) *Dynamic Oceanography*.—The flow of real and ideal fluids, emphasizing the influence of turbulence of the ocean and rotation of the earth; applications to studies of the circulation of the oceans. Corequisite: Oceanography 308. Credit will not be granted for both Oceanography 401 and 514.

515. (1½) *Water Waves*.—Surface and internal gravity waves; theory and observations. Wave-wave and wave-current interactions; wind-wave generation; tidal theory and prediction.

516. (1) *Waves in Rotating Fluids*.—Gyroscopic and planetary waves and their role in the time-dependent response of the ocean to meteorological and tidal forcing. Offered in alternate years.

517. (2) *Turbulence*.—A discussion of turbulent fluid motion, presenting both the empirical aspects and the development of statistical theories, including the spectrum of turbulence and similarity and equilibrium hypotheses. Offered in alternate years.

518. (1½) *Dynamic Meteorology*.—The general circulation of the atmosphere for students with a basic knowledge of geophysical fluid dynamics. The general circulation of the troposphere. Axisymmetric models. The role of eddies. Baroclinic instability. Numerical models. Tropical circulation. Middle atmosphere dynamics.

519. (1½) *Seminar in Marine Sediment Geochemistry*.—A review of selected areas of recent research on the geochemistry of marine sediments. This course is intended for graduate students with qualification in chemistry or geochemistry.

526. (1½) *Satellite Remote Sensing: Applications to Oceanography and Meteorology*.—A review of the satellite-sensed data products used in research and operational aspects of oceanography and meteorology. This course is the same as Geography 526.

549. (3/6)c *M.Sc. Thesis*.

649. *Ph.D. Thesis*.

Ophthalmology (Faculty of Medicine)

390. (½) *An Introduction to Diseases of the Visual System*—This course is primarily directed toward itinerant teachers of the visually disabled and will be given as 15 hours of lectures.

450. *Ophthalmology*.——Third year Medicine Students only: An introduction to Clinical Ophthalmology. Five morning sessions introducing the third year Medical Students to basic ophthalmic history, clinical symptoms, signs and patient management.

700. *Ophthalmology Rounds*.—Demonstration, review of signs and symptoms, etiology, pathogenesis and treatment of current general ophthalmic disorders. One and one half hours weekly.

702. *Ophthalmic Microbiology*.—Supervised demonstration, diagnosis and discussion of microbiology problems, involving patients, slides and cultures. One hour weekly.

703. *Ophthalmic Pathology I*.—Supervised demonstration, discussion and tutorial of current ophthalmic pathological specimens. One and one half hours weekly.

704. *Ophthalmic Pathology II*.—Clinicopathological correlation of ophthalmic specimens. One hour weekly.

705. *Neuro-ophthalmology*.—Lectures and seminars to cover the important and common neuro-ophthalmic disorders, emphasizing etiology, pathogenesis, treatment and investigation. One hour weekly.

706. *Retina and Fluorescein Angiography Tutorial*.—Lectures and demonstrations of retinal disease, study and interpretation of fluorescein angiograms. One and one half hours weekly.

707. *Glaucoma Tutorial*.—Lectures and demonstrations to cover signs, symptoms, pathogenesis, etiology, investigation and treatment of ocular hypertension. One hour weekly.

708. *Ocular Motility Tutorial*.—Lectures and demonstrations of motility problems, with clinicopathological correlations. One and one half hours weekly.

709. *Ophthalmic Research*.—During the first year of ophthalmic training for those residents choosing this selective activity.

710. *Lectures in anaesthesiology, radiology, radiotheraphy, plastic surgery, Ear Nose and Throat, Neurology, Neurosurgery, diabetes, hypertension optics as they pertain to ophthalmology* — two hours per week.

Oral Biology
Oral Medicine
Oral and Maxillofacial Surgery
Orthodontics

See course listings under Dentistry

Orthopaedics (Faculty of Medicine)

425. *Introduction to Orthopaedics*.—Introduction to the art and practice of history taking, and of physical examination of the musculoskeletal system.

450. *Principles of Orthopaedics*.—Clinical manifestations and principles of treatment of musculoskeletal disease in adults and children, both in Outpatient and Inpatient clinical settings.

475. *Orthopaedic Clinical Clerkship*.—An elective two-week Clinical Clerkship in Orthopaedics. Participation in preoperative and postoperative patient care under supervision of an Orthopaedic Faculty Member.

On request the elective may be extended for a further period of 4 to 8 weeks, and may be structured to allow special exposure to one or more sub-specialities in the field of Orthopaedics.

715. *Orthopaedic Clinic*.—Evaluation of new patients and diagnosis and treatment of appropriate diseases. Basic signs and clinical features are both stressed in the total management of the patient. Two hours per week in the Outpatient Department under supervision of an Orthopaedic Faculty member.

716. *Orthopaedic Bedside Clinic*.—Evaluation of orthopaedic diseases and injuries in patients at bedside. A review of clinical features is correlated with relevant physiology and pathology.

717. *Orthopaedic Grand Rounds*.—Formal presentations by the orthopaedic residents, under the supervision of assigned faculty members. Subject matter includes the whole spectrum of orthopaedics.

718. *Rheumatology Conference*.—Patients with a variety of rheumatological disorders are presented for discussion and evaluation in this combined conference, which rheumatologists and orthopaedic surgeons who have a special interest in reconstructive surgery attend. During each weekly two hour session, patients with difficult management problems are presented for clinical evaluation and discussion of medical and orthopaedic treatment.

719. *Orthopaedic Surgical Anatomy*.—A Course in clinical anatomy as applied to orthopaedics. A regional approach involving surgical dissections in cadavers. Each session lasts one hour and is supervised by a Faculty member. Emphasis is on surgical anatomical approach.

720. *Orthopaedic Basic Science Course*.—Weekly lectures by orthopaedic faculty and guest faculty from other departments. Lecture topics include applied physiology, anatomy, and pathology as they relate to orthopaedic diseases.

721. *Orthopaedic Seminars*.—A series of seminars is given weekly, and during each 1½ hour session, a topic in clinical orthopaedics is reviewed. The subject matter includes the whole spectrum of orthopaedics. One or more faculty members are in attendance at each seminar.

722. *Paediatric Orthopaedics*.—Case presentation in paediatric orthopaedics, stressing history, physical findings and total management of the patient, including a review of paediatric fractures with x-rays.

723. *Orthopaedic Surgery*.—The practical application of orthopaedics in the operating room with discussion of techniques of surgery, anatomy, pathology, pathophysiology and complications of diseases.

724. *Trauma Rounds*.—Orthopaedic traumatology is reviewed, with emphasis being placed on applied basic science, surgical anatomy, diagnosis and definitive management. These sessions are supervised by a faculty member and are held weekly, each session lasting one and one half hours.

725. *Bone Tumour Registry*.—A review of bone tumour and related problems with presentation of clinical and laboratory information, radiographs and pathological materials. One and one half hours monthly.

904. *Seminar in Orthopaedics*.—A series of 60 seminars in orthopaedics and traumatic surgery given over a two-year period — thirty sessions in each of the two years. One evening per week throughout the winter session. For post-graduate students proceeding to Certification and Fellowship of the Royal College of Physicians and Surgeons of Canada.

Paediatrics (Faculty of Medicine)

351. (3) *Human Physical Growth and Development*.—An examination of the factors concerned with human physical growth and development from conception to maturity, their assessment and study, with emphasis on normal variation and sexual dimorphism. A review of factors which may influence growth and development adversely will be included, but the major emphasis is on normal patterns. Permission must be obtained for non-medical students.

425. *Introduction to Paediatrics*.—Fourteen hours of lectures and seven four-hour clinical sessions, which serve as an introduction to growth and development, clinical appraisal of healthy and handicapped children, understanding the mother-child relationship, history taking and physical examination, and certain fundamental aspects of child health care.

450. *Principles of Paediatrics*.—1. This is a series of lectures and clinics devoted to paediatrics. Students are as far as possible taught in small groups. 2. Students are assigned to the Department of Paediatrics for four afternoons a week for a five-week period. This time is devoted primarily to methods of history-taking and physical examination of infants and children. Morning clinics of two hours a day, five days a week are held for ten weeks. The students are encouraged to follow up their cases insofar as the four afternoons a week allow this.

451. *Paediatric Infection and Immunity*.—Pathophysiology of infection and the immune response in the young host. Third year elective.

475. *Paediatrics*.—Students are assigned to the Department of Paediatrics for a seven or eight-

week student internship. For half of the period they are on the in-patient services and are assigned individually to a clinical teaching ward. They are responsible for histories and physical examinations, participate in planning investigation and management and follow the progress of patients allocated to them under the direct supervision of the Resident Staff. They take part in the daily ward rounds and attend the weekly teaching rounds of their ward and of the Department. In the evenings they are on duty on rotation under appropriate supervision to observe and participate in the care of acutely ill patients admitted. For the remaining weeks, the students may choose electives, which must be approved by the Department. There are nine hours of formal teaching by Faculty members of the Department each week.

700. *Grand Rounds*.—Lecture or group presentation of current paediatric topics or advances in paediatrics, followed by discussion. One hour weekly.

701. *Case Management Rounds*.—Case presentations and discussion of interesting patients, often of a problematic nature, with a review of the current knowledge of the particular disease or malformation presented. One hour weekly.

702. *Fundamental Principles of Paediatric Haematology*.—A review of encountered problems related to paediatric haematology, with particular reference to childhood anaemias and leukaemias and investigation thereof.

703. *Seminars in Paediatric Nephrology*.—A review of renal pathology and clinical manifestations of anatomical abnormalities and diseases of the urinary tract.

704. *Paediatric Neurology*.—A series of seminars, group discussions and case presentations, with emphasis on neurological examination and Gesell testing of normal and abnormal infants and children. Common neurological problems are presented and discussed.

705. *Paediatric Emergencies and their Treatment*.—A course held twice weekly for two months, as an introduction to emergency situations in paediatrics.

706. *Paediatric Surgery*.—A clinically-oriented course with case presentations of surgical conditions particularly related to childhood. One hour weekly.

707. *Basic Science Seminars in Neonatology*.—A scientific review of problems encountered in the foetus or newborn infant. A literature review incorporating the most recent information is presented and a scientific basis for diagnostic, preventive or treatment aspects is considered. One to two hours weekly.

708. *Neonatal Radiology Seminar*.—An organized group of current case presentations based on radiographic films in which the diagnosis or evaluation of progress in a new born infant is discussed. The limits of diagnostic usefulness, and suggestions for subsequent investigation and management are explored. One hour weekly.

711. *Special Problems in Intensive Care*.—A group of special problems in the Intensive Care Nursery are presented and discussed from the standpoint of etiology, diagnosis, management and ultimate outcome. One to two hours weekly.

712. *Perinatal Mortality Conference*.—Discussion of perinatal mortality cases for the month, with review of clinical and laboratory findings, management and pathology findings by paediatric, obstetrical and pathology teaching staff. Methods of possible prevention of foetal or neonatal death are discussed and recommended as hypothetical reasons for preventability, when appropriate. Two hours monthly.

713. *Seminars in Biochemical Paediatrics*.—A series of discussions on clinical problems which are chosen to illustrate the biochemical basis for the practice of paediatrics.

714. *Paediatric Pathology*.—Demonstration and dissection of congenital heart lesions; correlation of cardiological and pathological data. One hour weekly.

715. *Paediatric Cardiology*.—A review of cases investigated during the previous week with demonstration of the investigative findings and discussion of the plan of management. One hour weekly.

Pathology (Faculty of Medicine)

201. (1) *Introductory Clinical Chemistry*.—Designed to prepare students to enter a hospital clinical chemistry laboratory in the summer at the conclusion of their second year.

202. (1) *Applied Practical Clinical Chemistry*.—The more practical aspects of clinical chemical analysis, which will incorporate lecture seminars and work in the clinical laboratory.

203. (1) *Introductory Haematology and Blood Banking*.—Introduction to haematology for people of a non-medical laboratory technology background.

204. (1) *Applied Haematology and Blood Banking*.—Lecture/workshops on the practical application of haematology, e.g. colorimetry, haemoglobinometry, blood film examination, red cell, white cell and platelet counting, and special workshops on anaemia, white cell disorders, coagulation and blood banking.

205. (½) *Elementary Theory and Practice of Microscopy*.—Theory and use of the standard compound microscope and its component parts. Some reference will be made to other types of microscopes.

206. (½) *Basic Histopathological Technique*.—Fixation, processing, embedding, thin sectioning and staining of tissues for histopathological examination.

210. (1) *Hospital Organization and Practical Training*.—Organization of work within the hospital. Students will serve a clerkship in the various departments in the Pathology laboratory in order to familiarize them with the clinical laboratory application of the techniques taught them during their second year.

230. (1) *Applied Medical Microbiology*.—Lectures and seminars in the hospital microbiology laboratory concerning the laboratory diagnosis and micro-organisms from selected categories of patients each normal working day.

301. (2) *Introduction to Medical Laboratory Science*.—An integrated approach to specific areas of the theoretical and practical aspects of those physical and biological sciences relevant to medical laboratory science. Emphasis will be placed upon the application of basic science to those clinical disciplines practised by the medical laboratory scientist, e.g. histochemistry, clinical chemistry, microbiology, haemotology, etc.

302. (1) *Medical Laboratory Science* — Laboratory Administration.—Personnel management, staff management relationships, stock control, record keeping etc. Medicolegal aspects of medical laboratory science. Theory and practice of quality control. Use of computers in the medical laboratory.

303. (2) *Medical Laboratory Science* — Principles of tissue culture and cytology.—Tissue culture techniques in clinical diagnosis; cytological techniques used in the diagnosis and control of cancer. Sex chromatin determination.

304. (2) *Medical Laboratory Science* — Normal Human Histology.—An advanced lecture and laboratory course in the microscopic structure of the human body necessary for a complete understanding of histochemistry and histopathology.

305. (2) *Modern Microscopy*.—A lecture and laboratory course in the theoretical and practical application of modern biological microscopes — compound, dissecting, comparison, dark ground, fluorescent, phase contrast, interference and electron microscopes.

375. *Introduction to Human Pathology*.—A lecture-demonstration course designed to acquaint students in the allied health professions with a basic understanding of the causes, natural history, and pathophysiology of common disease processes. Prerequisite: Biology 101 or 102, Chemistry 103, 110 or 120, Physiology 301, Biochemistry 300, Anatomy 390 and Anatomy 501 or their equivalents.

390. (2) *Basic Pathology*.—A lecture course for students in allied health sciences designed to review basic pathologic processes involving various body systems. [2-0; 2-0]

401. *Principles of Pathology*.—A lecture and seminar course designed for dental students and dealing with the understanding of human diseases.

402. (2) *Medical Laboratory Science* — Haematology.—A theoretical and practical examination of those modern concepts of haematology which relate to the practice of medical laboratory science.

403. (1) *Nuclear Medicine for Medical Laboratory Scientists*.—An introductory course in Nuclear Medicine designed specifically for Medical Laboratory Scientists. All aspects of Nuclear Medicine will be taught in general with specific attention given to those areas directly affecting the Pathology laboratory.

404. (3) *Diagnostic Histochemistry*.—A lecture and laboratory course that encompasses the theory and the practice of currently available histochemical techniques. This course is to supplement the histopathological technique course taken as a requirement for CSLT (RT) certification.

405. (1) *Seminars in Current Topics*.—This seminar course is intended to train students in the oral presentation of scientific papers and make them critically aware of the current literature. They will be assigned, on a rotational basis, current issues of journals in the field of laboratory medicine. In consultation with faculty they will select one or more papers for review in a 15-20 minute presentation. The presentation will be followed by a general discussion.

406. (3) *Medical Laboratory Science* — Clinical Chemistry.—This course will review and discuss the methodology of clinical chemistry in order to put these analytical methods into the broad perspective of the pathophysiology of human disease and biochemistry.

407. (2) *Medical Laboratory Toxicology*.—Analytical, Clinical and Forensic — A theoretical and practical examination of analytical and pathophysiological aspects of clinical and forensic toxicology. Prerequisites for students not registered in the Bachelor of Medical Laboratory Science program: Biochemistry 300, Chemistry 311 and Pathology 375 or their equivalent.

417. (1½) *Microbial Infection in Humans*.—Consequences of invasion of the human host by pathogenic bacteria, viruses, fungi or parasites, including mechanisms causing clinical symptoms, and rationale of antimicrobial therapy and prophylaxis. Prerequisite: Microbiology 403. [0-0; 2-2]

425. *Human Pathology*.—This course covers the basic principles of general pathology and their application on a systemic basis as an introduction to the study of clinical medicine. Emphasis is placed on the etiology, pathogenesis and natural history of disease. Disordered physiology and biochemistry are correlated with the pathologic lesions that comprise organic disease. The course consists of lectures and correlated laboratory periods which include gross and histopathology, autopsy demonstrations, clinical biochemistry, clinical pathological conferences, and student seminars. Two terms.

427. *Bacteriology, Mycology, Virology and Parasitology*.—All groups of microorganisms pathogenic for man will be described as follows: Clinical features, pathogenesis and pathology, epidemiology, properties of the agents (bacteria, fungi, viruses and parasites), immunological reaction, laboratory diagnosis, therapy, preventive measures. Antibiotics. Defence mechanisms of the body. Sterilization. For students in the Faculty of Medicine.

447. *Directed Studies*.—A special elective program of directed studies in clinical or molecular microbiology for students in their first medical year who have completed third year science courses in a major program in microbiology, subject to approval by the Head of the Department. For students in the Faculty of Medicine.

448. (1) *Introduction to Laboratory Medicine*.—An elective course open to first year medical students who spend at least three consecutive hours each week in one of the affiliated hospitals of the Department of Pathology, Vancouver General Hospital, under the joint supervision of a Senior Resident in Pathology and the Professional Staff of the following Divisions: anatomical pathology, clinical biochemistry, haematology, paediatric pathology. Enrolment is limited.

450. *Systemic Pathology*—A series of Pathology discussions in conjunction with various clinical departments designed to illustrate the role of Pathology in the diagnosis and management of various diseases.

451. (1½) *Clerkship in Laboratory Medicine*.—An elective course open to third-year medical students, designed to familiarize the student with various subspecialties of Laboratory Medicine, including Haematology, Clinical Biochemistry, and Nuclear Medicine.
This elective may involve attendance at one or more affiliated hospitals.
Registration requires consent of the Department, and enrolment may be limited.

452. (1½) *Clerkship in Anatomic Pathology*.—An elective course open to third-year medical students, designed to familiarize the student with Anatomic Pathology, including Surgical Pathology, Paediatric Pathology, Autopsy Pathology and Cytology.
This elective may involve attendance at one or more affiliated hospitals.
Registration requires consent of the Department and enrolment may be limited.

457. (1½) *Clinical Laboratory Microbiology*.—Selected clinical laboratory exercises plus seminars to illustrate the diagnosis and management of patients with microbial infections. Elective course limited to Third Year medical students. Departmental approval.

475. *Medical Jurisprudence*.—A general survey of medico-legal problems likely to be encountered by physicians. The role of forensic medicine and toxicology in the administration of justice is emphasized.

500. (3) *General Principles of Pathology*.—The general principles underlying the etiology, pathogenesis, disordered physiology and pathologic anatomy of common disease processes will be discussed, with emphasis on the experimental approach.

502. (3) *Histochemistry in Pathology*.—A lecture and laboratory course that encompasses the theory and the practice of currently available histo-chemical techniques as applied to pathological material. A basic knowledge of Histology is preferable but not essential.

506. (1) *Ultrastructural Pathology*.—A review of fine structure as seen in various pathological conditions. Prerequisite: a knowledge of Microscopic Anatomy and Pathology 425 or 500.

509. (3) *Viral Ecology*.—Range of viruses infectious for man and domestic animals, methods of spread, laboratory diagnostic procedures, morphological properties, biophysical and biochemical aspects, virus-cell interactions, insect viruses, plant viruses. To be taken only with permission of the Head of the Department.

510. (2) *Analytical Methods in Chemical Pathology*.—A survey of the application of the principles of analytical chemistry to the investigation of disease. A knowledge of basic analytical chemistry is a prerequisite.

512. (2) *Chemical Pathology*.—A critical survey of current knowledge relating to the physiological and metabolic disturbances underlying disease.

515. (4) *Experimental Pathology*.—A lecture and laboratory course designed to develop laboratory skills particularly applicable in experimental pathology. Prerequisite: Pathology 500.

518. (1-2)c *Pulmonary Pathophysiology*.—A review of current topics in pulmonary pathophysiology at an advanced level suitable for graduate students majoring in pathology, medicine, surgery or anesthesiology. Topics will include lung anatomy, ventilation, blood flow, gas exchange and fluid and solute exchange. Physiologic abnormalities caused by pathological changes will be examined in detail. Prerequisites: Pathology 401, 425, or 500, and Physiology 301, 303, or 400, or equivalent.

519. (3) *Public Health Medical Microbiology*.—Clinical and epidemiological approach to investigation and control of microbial infections due to bacteria, fungi, parasites, and viruses; use of the microbiological laboratory in epidemiological investigations. To be taken only with the permission of the Head of the Department.

520. (2) *Recent Advances in Bio-Pathology*.—A series of lectures with related reading designed to cover new concepts in Biopathology with emphasis on functional and structural alterations in disease. Prerequisites: M.D. or D.M.D. degree or Pathology 500.

521. (3) *Research Topics in Pathophysiology*.—A lecture and laboratory course reviewing current areas of research in Pathophysiology. Registration requires permission of the Department.

523. (1½) *Principles of Antimicrobial Chemotherapy*.—Classification, structure and mode of action of antimicrobial agents. In depth comparison of factors affecting the activity of antimicrobials in vivo and in vitro. Prerequisite: MICB 200.

524. (1½) *Microbial Pathogenicity*.—Determinants in host and microbe which affect the course and expression of disease in humans. There will be emphasis on the relative importance of the host. To be taken only with permission of the Head of Division of Medical Microbiology. Prerequisites: MICB 403 or PATH 427 or the equivalent.
[2-1; 0-0]

525. (1) *Immunopathology*.—A lecture course which deals with those immunologic events which can cause tissue injury. Prerequisite: Pathology 500 or 425.

527. (1-3)c *Bacteriology, Mycology, Virology and Parasitology*.—All groups of microorganisms pathogenic for man, involving clinical features, pathogenesis and pathology, epidemiology, properties of the agents, immunological reaction, laboratory diagnosis, therapy, preventive measures. Requires permission of the Head of the Division of Medical Microbiology.

531. (1½) *Advanced Oncogenetics*.—Same as MEDG 521.

535. (1) *Seminar*.—Attendance required of all M.Sc. candidates in the Department.

548. (1-3)c *Directed Studies in various fields of Pathology*.

549. (9) *M.Sc. Thesis*.

560. (2) *Radiopharmaceuticals in Nuclear Medicine*.—An analysis of practical and theoretical problems involved in the production and manufacture of radioactive drugs used in the diagnosis and treatment of human diseases with particular emphasis on short-lived nuclides. Quality control, B.P. and U.S.P. standards, sterility, stability, pyrogenicity, biological properties, tissue distribution, effective half life, radiation dose, health safety.

561. (1) *In Vitro Assay Techniques in Medicine*.—Theoretical considerations concerning qualitative and quantitative in vitro assay techniques used in Nuclear Medicine. These include isotope dilution, competitive protein binding, radio-immunoassay, neutron activation analysis and gamma ray spectrometry.

562. (1) *Clinical Nuclear Medicine*.—The clinical application in vitro and in vivo of radioactive visualization procedures in diagnostic and therapeutic nuclear medicine with emphasis on appropriate utilization of those procedures and their role in patient diagnosis.

575. (2) *Forensic Pathology*.—Modern forensic practice for pathologists and others concerned with forensic sciences. Prerequisite: PATH 425.

635. (1) *Seminar*.—Attendance required for all Ph.D. candidates in the department.

649. *Ph.D. Thesis*.

700. *Pathology Conference*.—Review and analysis of current cases. Diagnostic and pathogenic significance of findings are assessed. One hour weekly.

701. *Surgical Pathology*.—Five days per week one hour review of current diagnostic biopsy problems. Diagnostic and therapeutic implications are discussed.

702. *Hematologic Pathology*.—Lectures and seminars on the pathology of hematological diseases. Two hours weekly.

703. *Histochemical Pathology*.—A series of lectures and seminars to show current applications of histochemical techniques to contemporary pathological diagnosis. One hour weekly per quarter.

704. *Hematologic Pathology*.—Analysis of pathology of bone marrow aspirates; taken in one half or whole year. One and one half hours weekly.

705. *Clinical Chemistry*.—A series of lectures, seminars, tutorials and, laboratory tuition to demonstrate the use of chemical analysis in clinical medicine. Two hours weekly.

706. *Neuropathology*.—Sectioning of necropsy material with clinicopathological correlation. One hour weekly.

707. *Neuropathology, Clinical correlation*.—Pathology of central nervous system disease demonstrated to clinical staff, stressing correlation with clinical diseases. Two hours weekly.

708. *Dermatopathology*.—Clinicopathological correlation of dermal lesions. Discussion of pathogenesis, clinical course, and prognostic implications. One hour weekly.

709. *Renal Biopsy Rounds*.—Weekly correlation between clinical status and pathological findings in several patients. (Same as Medicine 711).

710. *Hepatic and Gastrointestinal pathology*.—Clinicopathological correlation of hepatic and gastrointestinal biopsy material with discussions of pathogenesis, etiology and therapeutic implications. Alternate weeks, one hour.

711. *Cytology*.—Daily review of cytopathology. Analysis of cervical and sputum smears and pleural, gastric and bronchial aspirates with discussion of significance to patients, taken in one quarter of year.

712. *Perinatal Mortality Conference*.—Discussion of perinatal mortality cases for the month, with review of clinical and laboratory findings, management and pathology findings by paediatric, obstetrical and pathology teaching staff. Methods of possible prevention of foetal or neonatal death are discussed and recommended as hypothetical reasons for preventability, where appropriate. Two hours monthly.

713. *Seminars in Biochemical Paediatrics*.—A series of discussions on clinical problems which are chosen to illustrate the biochemical basis for the practice of paediatrics.

714. *Paediatric Pathology*.—Demonstration and dissection of congenital heart lesions; correlation of cardiological and pathological data. One hour weekly.

720. *Microbiological Diagnosis*.—Conduct of bacterial, fungal, parasitological, and viral laboratory tests relevant to the microbiological examination of patients.

721. *Microbiological Research*.—Conduct of research on some aspect of clinical or basic microbiology.

722. *Microbial Infections*.—Review in depth of syndromes caused by common human pathogenic bacteria, fungi and viruses including principles of current laboratory diagnostic procedures and the rational use of antibiotics and prophylactic agents.

723. *Procedures and Interpretation in Clinical Microbiology*.—This course will cover comprehensively the methods used for taking and for processing patient specimens, and the interpretation of results. Cases will be discussed to emphasize and to illustrate the applicability of diagnostic microbiological techniques to the diagnosis, treatment and prevention of infectious diseases. For Residents in Medical Microbiology, General Pathology and Infectious Diseases.

725. *Histopathology of Infectious Diseases*.—Gross and microscopic changes associated with infections, and the pathophysiology involved in their development. The course includes seminars based on histological specimens. For Residents in Medical Microbiology, General and Anatomical Pathology, and Infectious Diseases.

726. *Human Parasitology*.—Life cycles, pathogenesis, epidemiology, laboratory diagnosis of medical parasites of man, with emphasis on clinical features/diagnosis. Review and analysis of current cases.

730. *Clinical Nuclear Medicine*.—See RADI 710

731. *Progress in Nuclear Medicine*.—See RADI 711

732. *Clinical Investigation/Research*.—See RADI 712

733. *Quality Correlation in Nuclear Medicine*.—See RADI 713

Pharmaceutical Sciences (Faculty of Pharmaceutical Sciences)

**Additional fees are charged for these courses. See "Special Fees" P. 22.

**110. (3) *Pharmaceutics I*.—Pharmaceutical technology procedures, basic principles and processes involved in the production of pharmaceutical preparations. [3-3; 3-3]

**210. (3) *Pharmaceutics II*.—A study of physical, chemical and biological concepts as they apply to dosage forms. [3-3; 3-3]

240. (1½) *Pharmacology for Nurses*.—A study of the effects, side effects, mechanism of action and interaction of drugs. Primarily intended for students in second year nursing.
[3-0; 0-0]

**310. (3) *Pharmaceutics III*.—Pharmacokinetics: the application of reaction kinetics to a study of factors affecting drug stability, stability testing, the prediction of shelf-life and the formulation and storage of pharmaceuticals. Biopharmaceutics: a study of the funda-

mental principles underlying the administration, absorption, distribution, metabolism and excretion of drugs. [3-3; 3-3]

320. (3) *Medicinal Chemistry*.—The chemistry of natural and synthetic organic medicinal products; physical and chemical principles of their mechanism of action and the relationship of chemical structure to biological activity. [3-0; 3-0]

**325. (3) *Pharmaceutical Analysis*.—An introduction to quality control methods used to analyse drugs including: aqueous, non-aqueous, redox, complexiometric, and potentiometric titrimetry: colorimetric, fluorometric, ultra-violet and infrared spectroscopy; paper, column thin-layer, gas-liquid, and high pressure-liquid chromatography; biochemical tests and the use of radiosotopes in Pharmacy. Prerequisites: Chemistry 205 and Chemistry 230. [3-3; 3-3]

335. (2) *Pharmacology I*.—A study of pharmacological principles; the pharmacology and therapeutics of chemotherapeutic agents. Prerequisites or corequisites: Biochemistry 300, Physiology 301 and 302, Microbiology 200. [0-0; 4-0]

340. (2) *Pharmacology II*.—The pharmacology and therapeutics of drugs affecting the autonomic, somatic and central nervous systems. Prerequisite: Pharmacy 335. [4-2; 0-0]

345. (2) *Pharmacology III*.—Pharmacology of cardiovascular and renal drugs; pharmacology of hormones; important diseases and the role of drugs in their treatment. Prerequisite: Pharmacy 340. [0-0; 4-2]

350. (1½) *Pharmaceutical Law, Ethics and Pharmaceutical Organizations*.—Early legislation pertaining to pharmacy; Provincial and Federal legislation affecting the practice of pharmacy; ethical principles and responsibilities and the historical development of contemporary pharmaceutical organizations. [3-0; 0-0]

401. (3) *Clinical Pharmacy and Therapeutics I*.—A study of current drug therapy and general measures used in the treatment of patients with diseases and disorders commonly encountered in community pharmacy practice. The rational use of prescription and nonprescription medication and the pharmacist's role in educating patients and monitoring their compliance will be emphasized. Prerequisite: In order to register in this course, students must have successfully completed all required courses taken in the first three years of the pharmacy curriculum. [3-0; 3-0]

402. (3) *Clinical Clerkship I—Ambulatory*.—Evaluation of drug usage in the ambulant patient; developing family drug record plans to review prescribed and self-selected medication usage; comparative evaluation of non-prescription drug products within therapeutic classifications; methods of interprofessional and patient information of above. Corequisite: Pharmacy 401, prerequisite or corequisite: Pharmacy 335. [1-5; 1-5]

403. (1½) *Clinical Clerkship II—Institutional*.—Pharmacy service in various types of hospitals ranging from acute to extended to specialty treatment objectives. Drug distribution methods, drug utilization control approaches, interprofessional relationships and specific patient drug therapy case studies are included. Corequisite: Pharmacy 401, prerequisite or corequisite: Pharmacy 335. [1-4 or 1-4]

405. (3) *Problems in Clinical Pharmacy*.—Individual assignments involving library and clinical investigation of specific problems relating to drug utilization and information topics. [0-6; 0-6]

406. (1) *Topics in Pharmacy Practice*.—A series of lectures and discussions of topics pertinent to clinically-oriented pharmacy practice in the community setting. Topics covered include aspects of drug and poison information, drug-related problem assessment, monitoring and education of patients, community services for patients, and professional standards of pharmacy practice. Prerequisite: In order to register in this course, students must have successful completion of all required courses of the first three years of the pharmacy curriculum. [1-0; 1-0] or [2-0; 0-0]

412. (2) *Sterile Pharmaceutical Products*.—A study of theory and methods of sterilization, and the considerations involved in the preparation of various types of sterile products. [0-0; 2-4]

414. (3) *Problems in Pharmaceutics and Biopharmaceutics*.—Individual assignments involving library and laboratory investigation of problems involved in the development of pharmaceutical dosage forms. [0-6; 0-6]

415. (2) *Topics in Pharmaceutics and Biopharmaceutics*.—A study of selected topics in the field of pharmaceutics and biopharmaceutics. (Registration restricted, permission of instructor required.) [2-0; 2-0]

416. (2) *Pharmaceutical Manufacturing*.—The formulation and production of pharmaceuticals including an introduction to selected pharmaceutical processes and plant protocol. Laboratory includes some individual formulation problems. (Enrolment restricted. Permission of the instructor is required.) [1-6*; 1-6*]

417. (2) *Clinical Pharmaceutics of Dermatologic and Ophthalmic Products*.—A study of locally administered pharmaceutical products for the treatment and care of the skin and the eye. [2-0; 2-0]

425. (3) *Drug Testing and Assaying*.—Modern analytical techniques applied to separation and analysis of pharmaceutical preparations and special methods employed in pharmaceutical research. Registration limited. [1-4; 1-4]

426. (3) *Problems in Pharmaceutical Chemistry*.—Research and library thesis projects related to problems in analytical and synthetic aspects of drugs and natural products, and molecular aspects of drug action. (Registration limited.) [0-6; 0-6]

427. (2) *Topics in Medicinal Chemistry*.—A more detailed study of the relation of chemical and physical properties and structure to biological activity. The groups of drugs to be discussed will vary from year to year. Prerequisite: Pharmacy 320. [2-0; 2-0]

434. (3) *Problems in Pharmacognosy*.—Individual library and laboratory investigations related to the isolation and the study of physical and chemical properties of compounds derived from biological sources. [0-6; 0-6]

435. (1½) *Pesticides*.—Chemical properties, physiological effects and usage of insecticides, nematocides, herbicides and fungicides. Pesticides and the environment. Prerequisite: Chemistry 230. (This course is the same as Plant Science 435.) [0-0; 3-0]

437. (2) *Topics in Pharmacognosy*.—Topics chosen from such areas as biosynthesis of natural products, microbiological transformation products, isolation and purification methods, commercial aspects of crude drug production and other areas of current interest. Prerequisite: Pharmacy 320. [2-0; 2-0]

444. (3) *Problems in Pharmacology*.—Individual assignments involving library and laboratory investigation of certain aspects of drug action. (Enrolment restricted.) [0-6; 0-6]

448. (1½) *Environmental and Cellular Toxicology*.—Toxicology of heavy metals, pesticides; mutagenic, teratogenic and carcinogenic effects of drugs. Prerequisites: Biochemistry 300, Physiology 301 and 302, Pharmacy 335, 340, 345. [0-0; 3-0]

450. *Selected Topics*.—Thesis or Essay. No unit value.

451. (1½) *Introduction to Pharmacy Management*.—Fundamental behavioural and managerial principles applied to pharmacy operations. Prerequisite: Economics 100 strongly recommended. [0-0; 3-0] or [3-0; 0-0]

452. (1½) *Topics in Pharmacy Administration*.—Selected topics in the field of pharmacy administration. Registration restricted, permission of instructor required. Prerequisite: Successful completion of the required courses of the first three years of the pharmacy curriculum. [0-0; 3-0] or [3-0; 0-0]

453. (1-3)**c** *Problems in Pharmacy Administration*.—Individual assignments involving library and field work investigations of problems associated with pharmacy administration, enrolment restricted. Prerequisite: Successful completion of the required courses of the first three years of the pharmacy curriculum.

454. (2) *Hospital Pharmacy Administration*.—Organization, staffing, hospital pharmacy services and their development, economics and purchasing, drug use control, specialized services, new trends and developments. Limited field work will be required as will oral reports based upon observations in the field and literature assignments. A term paper will be required. Registration limited. Permission of instructor required. [0-0; 2-3]

455. (2) *Community Health Services and Pharmacy Practice*.—Issues in health care, community health services and pharmacy practice. [2-0; 2-0]

469. (0) *Professional Practice Clerkship*.—A 160 hour clerkship normally completed during a 4-5 week period in the summer immediately prior to entering the fourth year Clinical Pharmacy courses.

500. (3) *Pharmaceutical Research Techniques*.—A lecture and laboratory course dealing with a variety of modern physical, chemical and biological techniques currently used in pharmaceutical research. Permission of instructor required.

503. (1-6)**c** *Graduate Clinical Clerkship*.—This course will consist of clinical rotations of 4-6 weeks duration (20-40 hours per week, 1 unit/rotation) in selected specialty areas in medicine and clinical pharmacy. Students will be assigned to clinicians in the selected specialty who are members of either the Faculty of Medicine or Pharmaceutical Sciences and who are appointed as clinical instructors for this course. Rotations will take place at the site(s) where the majority of the clinician's practice is conducted.

510. (1-3)**d** *Advanced Pharmaceutics I*.—A study of physical and chemical properties of pharmaceutical systems with emphasis on formulation and preparative aspects.

511. (1-3)**d** *Advanced Pharmaceutics II*.—A study of problems in pharmaceutics with emphasis on biopharmaceutical aspects.

512. (1) *Advanced Pharmaceutics III*.—A study of problems in pharmaceutics with emphasis on aspects of quality evaluation.

521. (1½) *Advanced Medicinal Chemistry I*.—A study of the underlying physical and chemical parameters determining drug action in representative classes of drugs.

522. (1) *Advanced Medicinal Chemistry II*.—A study of the theories and kinetics of drug receptor interactions and recent advances in the molecular properties of drug receptors.

530. (2) *Advanced Pharmacognosy*.—A detailed study of selected compounds of biological origin useful in the fields of Pharmacy and Medicine.

540. (1-3)**d** *Topics in Pharmacology*.—Lectures and supervised studies in selected areas of pharmacology. (Enrolment restricted).

541. (1½) *Drug Metabolism and Toxicology*.—The biotransformation of drugs, pesticides, carcinogens and other foreign chemicals in animals and humans. The biochemical mechanisms responsible, particularly the cytochrome P-450 mono-oxygenases, will be emphasized. The formation of toxic reactive metabolites and their effects will be discussed. (Enrolment restricted.)

542. (1½) *Central Nervous System Pharmacology*.—A course comprised of lectures, assigned readings and reports on selected topics dealing with drug actions in the central nervous system. Given in alternate years. (Permission of instructor required).

543. (1½) *Advanced Laboratory in Pharmacology*.—A laboratory course giving instruction in the methods and techniques used in pharmacological research. Registration limited. [0-0; 0-6]

544. (1½) *Physiology and Pharmacology of the Autonomic Nervous System*.—A lecture and seminar course dealing with adrenergic, cholinergic and peptidergic transmission in the peripheral nervous system. Topics to be discussed will include mechanisms of synthesis, storage and release of neurotransmitters and effects of drugs on these processes. Given in alternate years. (Permission of instructor required).

545. (1½) *Cardiovascular Pharmacology*.—A course composed of lectures, assigned readings and conferences dealing with aspects of drug actions and cardiovascular function. Topics include the role of adenylate cyclase in cardiac function, the role of calcium in myocardial contractility and the effect of drugs on myocardial and vascular function. Enrolment restricted. Given in alternate years.

548. (1) *M.Sc. Seminar*.—Attendance at regular seminars throughout the session and presentation of one or more papers on selected topics.

549. (3/6)**c** *Master's Thesis*.

550. (1-3)**c** *Directed Studies*.

560. (2) *Radiopharmaceuticals in Nuclear Medicine*.—An analysis of practical and theoreti-

cal problems involved in the production and manufacture of radioactive drugs used in the diagnosis and treatment of human diseases with particular emphasis on short-lived nuclides. Quality control, B.P. and U.S.P. standards, sterility, stability, pyrogenicity, biological properties, tissue distribution, effective half life, radiation dose, health safety.

The laboratory will consist of producing and quality control testing many of the radioactive drugs used in nuclear medicine.

Available to senior undergraduate or graduate science, pharmacy or medical students. Limited to 10 students. Fundamental knowledge of physics, chemistry and biology is required. (This course same as Pathology 560.)

561. (1) *In Vitro Assay Techniques in Nuclear Medicine*.—Theoretical considerations concerning qualitative and quantitative *in vitro* assay techniques used in nuclear medicine. These include isotope dilution, competitive protein binding, radioimmunoassay, neutron activation analysis and gamma ray spectrometry.

The laboratory will consist of the performance of the above assay techniques by individual students.

Available to senior undergraduate, or post-graduate science, pharmacy or medical students. Limited to 10 students. Fundamental knowledge of physics, chemistry and biology required. (This course same as Pathology 561.)

648. (1) *Seminar for Ph.D. Students*—Attendance at regular seminars throughout the session and presentation of one or more papers on selected topics.

649. *Doctor of Philosophy Thesis*.

Pharmacology and Therapeutics (Faculty of Medicine)

300. (3) *Introduction to Pharmacology*.—The concepts, language and techniques of scientific pharmacology. Intended primarily for Honours and Major students in Pharmacology. Prerequisites: Biology 200 and 201; Chemistry 203 (or 230) and 201, 202 (or 205); permission of the Head of the Department. (Students are advised not to take this course unless their standing in the prerequisites is at least 60%.) [3-3*; 3-3*]

390. (3) *Basic Human Pharmacology*.—A course of lectures and assigned reading on the pharmacology of drugs used in man. The effects, mechanisms of action, absorption, distribution, fate and excretion of the major classes of therapeutic agents will be studied. Indications for the use of particular agents will be discussed in terms of risk versus benefit for the individual and for society. Co- or prerequisites: Biochemistry 302 or equivalent, Physiology 301 or equivalent. Not intended for premedical or premedical students. Permission of the Department Head is required. [3-0; 3-0]

400. (3) *Systematic Pharmacology*.—Lectures in scientific pharmacology designed to be taken in conjunction with Pharmacology 402. All aspects of the study of drugs will be covered, but the course will concentrate on the scientific aspects of the pharmacology of neurohumoral transmission and to a lesser extent on the pharmacology of various organs and tissues. Prerequisite: Pharmacology 300. [3-0-1*; 3-0-1*]

402. (3) *Systematic Pharmacology Laboratory*.—A series of demonstrated, group, and individual laboratory experiments designed to illustrate the concepts and hypotheses of pharmacology. The course is restricted to Honours students in Pharmacology, but may be taken by others with permission of the Head of the Department. Prerequisite: Pharmacology 300. [0-9; 0-9]

404. (1½) *Drug Assay and Pharmacometrics*.—The techniques used to detect and measure concentrations and actions of endogenous or exogenous chemicals, using chemical assays and bioassays as appropriate. Enrolment limited to Honours students in Pharmacology and others with permission of the Head of the Department. Prerequisites: Pharmacology 300 and Biology 300. [1-0; 2-0]

425. *Medical Pharmacology*.—A lecture and laboratory course covering the fundamental pharmacological action of drugs. Both terms.

448. (1-3)c *Directed Studies in Pharmacology*.—Advanced investigation of a specific topic in Pharmacology.

451. (1½) *Review of Clinical Pharmacology*.—A lecture and seminar course dealing with selected problems in therapeutics. This course has been designed as a basic science elective for third-year medical students. Departmental approval.

452. (1½) *Medical Aspects of Nutrition*.—A lecture course covering essentials of nutrition as related to metabolism and disease. This course has been designed as a basic science elective for third-year medical students. Departmental approval.

453. *Therapeutics*.—A lecture, assigned problems, and discussion course dealing with practical aspects of therapeutics. This course is designed to give third year medical students some practical experience in the science of drug prescribing.

500. (1½) *Molecular Aspects of Drug Action at the Membrane Level*.—Lectures, discussion and assigned reading on Receptor Kinetics; Occupancy and Rate Theories of Drug Action; Receptor Models; Approaches to Receptor Isolation; Effects of Drugs and Membrane Processes. (Given in even numbered and alternate years).

501. (1½) *Structure-Activity Relationships of Pharmacological Agents*.—Lectures, discussions and assigned reading on physiochemical approaches to drug design—the relationship between molecular structure and pharmacological activity in various representative classes of drugs. (Given in even numbered and alternate years).

502. (2) *Drugs and Intercellular Communication (including Neuropharmacology)*.—Lectures, discussions and assigned reading on the actions of drugs on the production, release, and cellular effects of hormones and neurotransmitters. (Given in odd numbered and alternate years).

512. (1½) *Experimental Design and Bioassay*.—The problems of testing the efficacy of drugs in animals and humans—what constitutes adequate controls and appropriate statistical analysis. Prerequisite: Mathematics 205 or Statistics 205.

513. (2) *Pharmacology of Anaesthesia*.—Advances in the pharmacological aspects of anaesthesiology. Conferences, assigned reading and laboratory exercises demonstrating the actions of drugs as currently applied in the practices of anaesthesiology. Prerequisite: Pharmacology 425.

548. (1-3)c *Directed Studies in Pharmacology*.—In special cases, with the approval of the Department Head, advanced courses may be arranged.

549. (6) *M.Sc. Thesis*.

649. *Ph.D. Thesis*.

Philosophy (Faculty of Arts)

100. (3) *Introduction to Philosophy*.—Some influential philosophical writing and doctrines, as an introduction to the problems and methods of Philosophy. Sections of this course vary; detailed descriptions are given in a booklet obtainable from the Philosophy Department. Some sections are given as three-unit, one-term courses, either [4-2; 0-0] or [0-0; 4-2] with limited enrolment. [3-0; 3-0]

102. (3) *Introduction to Logic and Critical Thinking*.—Examination of the nature and value of rational inquiry. Practice in reasoning clearly and critically, presenting and evaluating arguments. Non-formal, logical tools for dealing with both everyday and more technical arguments and concepts. Techniques for the analysis and resolution of confusions, ambiguities and fallacies. [3-0; 3-0]

115. (3) *Introduction to History and Philosophy of Science*.—An interdisciplinary introduction to the nature of science and technology; their place in modern culture. The course will focus on several issues, their historical development, and philosophical significance. The issues will vary from year to year. (Also listed as History 115.) [2-1; 2-1]

201. (3) *Problems in Ethics and Social Philosophy*.—Problems selected for their general interest with readings from both classic and contemporary sources. [3-0; 3-0]

210. (3) *Greek Thought*.—A survey of Greek philosophy, science and religion given collaboratively by members of the Departments of Classics and Philosophy. The pre-Socratics, Plato, Aristotle, Stoicism, Epicureanism. This course is recommended as preparation for Classical Studies 436 and Philosophy 333. Open to second-year and first-year students. (Also listed as Classical Studies 210.) [2-1; 2-1]

214. (3) *Scientific Reasoning*.—An introduction to philosophy through an examination of some central problems in the philosophy of science: the analysis of scientific method, the status of explanations and laws in science, and the notion of scientific progress. [3-0; 3-0]

250. (3) *Epistemology and Metaphysics*.—Topics in general philosophy: scepticism concerning the external world; mind-body problems; problems concerning perception; induction; free will. Readings in classic and contemporary texts. This course is intended primarily for prospective Honours and Majors students in Philosophy. It is also open to students with a special interest in the subject. [3-0; 3-0]

301. (3) *Ethics*.—A study of the main problems of contemporary moral philosophy, with attention to the recent literature and some classic works. The course examines substantive theories of value and morality with practical applications, and theories about the nature and basis of value and moral judgments, and about the roles of reason, emotion and choice. The course is required of Philosophy Majors, but is open to other students. [3-0; 3-0]

302. (1½) *Deductive Logic*.—Introduction to symbolic or formal logic. Sentential and predicate logic. The development of a system of deduction based on natural deduction or semantic tableau techniques. Translations of natural languages into a formal language. [2-1]

303. (1½) *Intermediate Logic*.—Continuation of 302. A system of deduction for predicate logic is selected for further study. Completeness of this system and the Löwenheim-Skolem theorem are proved. The elementary theory of recursive functions is developed and used to prove Gödel's incompleteness result and Church's undecidability theorem. Prerequisite: 302. [3-0]

305. (1½) *Philosophy of Logic*.—A study of the fundamental concepts and methods of logic. The logistic method, syntax and semantics. The conditional; entailment; consequence; modal logic; problems concerning extensionality and intensionality. Frege's distinction between sense and reference; Russell's theory of definite descriptions; Tarski's definition of truth. The relations between logic and mathematics. Prerequisite: 302. [3-0]

306. (1½) *Modal Logic*.—Logic of the modal operators "It is necessary that" and "It is possible that." Possible-world semantics and a method of derivation for this logic. Applications to other modal operators: "ought" (deontic logic) and "knows" (epistemic logic). Problems of a modal quantifier logic. Prerequisite: Philosophy 302. [3-0]

311. (3) *Philosophy of Art*.—The arts and their relation to society. Problems examined usually include art and perception, art and reality, imagination, expression, censorship, and the role of art in human life. No prerequisites. [3-0; 3-0]

313. (1½) *Ethical and Political Issues in Contemporary Science and Technology:* A.—An investigation of ethical, political, and other philosophical issues arising from the interaction of science/technology with social institutions. Topics and case-studies from areas such as ethical issues for individual professionals, public policy, and international development. No prerequisites. [3-0]

314. (1½) *Ethical and Political Issues in Contemporary Science and Technology:* B.—For description see Philosophy 313. Prerequisite: Philosophy 313 or permission of the Department. [3-0]

317. (3) *Philosophy of Religion*.—A critical and analytical examination of arguments for and arguments against the existence of God, and other related topics. [3-0; 3-0]

323. (3) *Chinese Philosophy*.—The development of Chinese philosophy and ethics from their beginnings through the nineteenth century, with emphasis on Confucianism, Taoism and Buddhism. Attention will be given both to ideas themselves and to their relationship with cultural context. (Also listed as Asian Studies 325.) [3-0; 3-0]

330. (6/9)c *Honours Tutorial. Third Year*. [0-1; 0-1]

333. (1½) *Ancient Philosophy: A.*—Intensive study of a major ancient philosopher, such as Plato or Aristotle, or a major ancient school or movement, such as the pre-Socratics or the Stoics. Topics vary from year to year and interested students should consult the Department. [3-0; 0-0]

343. (1½) *Ancient Philosophy: B.*—For description, see Philosophy 333. Prerequisite: Philosophy 333 or permission of instructor. [0-0; 3-0]

350. (3) *Epistemology and Metaphysics.*—The problem of scepticism concerning the external world; problems concerning mind and body, perception, free will. Readings from philosophers such as Locke, Berkeley, and Hume, as well as from contemporary philosophers. Credit will not be given for both Philosophy 250 and Philosophy 350. [3-0; 3-0]

353. (1½) *Topics in the History of Modern Philosophy: A.*—Intensive study of a major modern philosopher, such as Descartes, Hume or Kant, or a major school or movement such as empiricism. Topics vary from year to year and interested students should consult the Department. [3-0; 0-0]

355. (3) *Philosophical Tradition of India.*—(Also listed as Asian Studies 355.) [3-0; 3-0]

363. (1½) *Topics in the History of Modern Philosophy: B.*—For description, see Philosophy 353. Prerequisite: Philosophy 353 or permission of the instructor. [0-0; 3-0]

373. (1½) *Medieval Philosophy: A.*—Survey of Western European thought, in its social and cultural setting, from Augustine to the 12th Century. Topics include: the interaction of Christianity and paganism; Augustine on the nature of man; Erigena and the Carolingian renaissance; Anselm; Abelard and the 12th century renaissance. Primarily for students not specialising in philosophy. No prerequisites. [3-0; 0-0]

383. (1½) *Medieval Philosophy: B.*—Survey of Western European thought, in its social and cultural setting, from the 12th to the 14th century. Topics include: the rediscovery of Aristotle; the influence of Islam; the rise of the universities; scholasticism; Bonaventure; Aquinas; Scotus; Ockham and after. Primarily for students not specialising in philosophy. Prerequisite: Philosophy 373 or permission of the instructor. [0-0; 3-0]

393. (1½) *Existentialism and Phenomenology: A.*—A critical examination of representative literature in existentialism and phenomenology. The readings will vary from year to year, and will be chosen from the works of Husserl, Heidegger, Merleau-Ponty, Sartre, and others. [3-0]

394. (1½) *Existentialism and Phenomenology: B.*—For description see Philosophy 393. Prerequisite: Philosophy 393 or permission of the instructor. [0-0]

400. (1½) *Social and Political Philosophy.*—An analytic study of central concepts and problems in political life and thought. Classic as well as contemporary texts will be used, chiefly from the perspective of contemporary political and philosophic concern. Concepts considered will include obligation; the citizen, agent and representative; public purpose and good; justice; equality; civil rights and liberty; disobedience; the relationship between moral and legal duty and between education and politics. [3-0]

401. (1½) *Social and Political Philosophy.*—For description see Philosophy 400. Prerequisite: Philosophy 400. [3-0]

402. (1½) *Topics in Symbolic Logic: A.*—Formal semantics, proof theory, incompleteness and decidability, axiomatic set theory, independence results. The Department should be consulted as to which topics are offered in a given year. Prerequisite: Philosophy 303, 305, or 306. [3-0; 0-0]

403. (1½) *Topics in Symbolic Logic: B.*—For description, see Philosophy 402. Prerequisite: Philosophy 402. [0-0; 3-0]

405. (1½) *Philosophy of Mathematics.*—Such questions as: would mathematics exist if there were no human beings? how does one decide whether a mathematical proposition is true? how is it that mathematics can be applied to the physical world? Readings from Frege, Russell, Hilbert, Gödel, Wittgenstein, Quine, and others. [3-0]

407. (1½) *Bio-Medical Ethics.*—Moral problems arising in the health sciences, especially in medicine but also in biology, psychology, social work, and some other professions, considered both concretely and in relation to general ethical theory. Among the problems are abortion, death and euthanasia, genetic engineering, behaviour modification, compulsory treatment, experimentation with human beings and animals, and the relationship between professionals and their patients, subjects or clients. No philosophical background is required. [3-0]

408. (1½/3)**d** *Philosophy of History.*—A study of the concepts of history and historical explanation, in which the ideas of historical progress, purpose, necessity, law and causation will be considered. Major thinkers such as Hegel, Marx, Vico, Spengler, Pareto, Collingwood, Croce, and Toynbee, as well as contemporary figures, will be dealt with in depth. Students admitted to the course will be expected to have an adequate knowledge of ancient or modern history as determined in consultation with the instructor. [3-0; 3-0]

410. (1½) *Morals, Politics and the Individual.*—Primarily for fourth-year and graduate students who have had no previous course in Philosophy. [3-0]

411. (1½) *Knowledge, Explanation, and the Nature of Things.*—Primarily for fourth-year and graduate students who have had no previous course in Philosophy. [3-0]

414. (3) *Philosophy of Science.*—Problems considered fall into two general categories: issues common to all sciences and philosophical questions growing out of specific scientific fields. Examples of the first include the character of scientific laws, theories and revolutions; the nature of scientific confirmation; causality; explanation and prediction; and the use of logic and probability. Examples of the second include difficulties in the interpretation of atomic physics and questions about relationships between biology and psychology. No philosophical background is assumed. [3-0; 3-0]

418. (1½) *Philosophy in Literature.*—Some central philosophical issues as reflected in works of literature. Among these issues are the question of God's existence, the nature of morality, freewill, the nature of the emotions, and personal identity. [3-0]

419. (1½) *Philosophy of Literature.*—Some metaphysical and epistemological presuppositions and implications of general theories of the interpretation and evaluation of literature. Theories from Heidegger, Sartre, Dewey, Beardsley, Derrida, Rorty, or others will be studied in relation to selected literary works. [3-0]

420. (1½) *Philosophy of Mind.*—The concepts of the mental and physical; problems of the relation between minds and bodies; problems of determining the meaning of statements about mental events. Prerequisite: Philosophy 250 or 350. [3-0]

421. (1½) *Philosophy of Law: A.*—The concepts of law, constitution and sovereignty; law and morality; natural law theories and legal positivism; obligation, responsibility and punishment. [3-0]

422. (1½) *Philosophy of Law: B.*—For description, see Philosophy 421. Prerequisite: Permission of the instructor. [3-0]

424. (3) *Philosophy of Social Science.*—Topics in the philosophy of science of special concern to the social and behavioural sciences; hypotheses and explanation; principles, theories, models; the formation of scientific concepts; the function of mathematics in social science. [3-0; 3-0]

426. (1½) *Philosophy of Psychology: A.*—The nature of theory in psychology and its relation to other scientific theories. In addition, specific topics will be examined such as the status of imagery in psychological theories; the extent to which human irrationality can be experimentally demonstrated; introspection as a source of evidence. Prerequisite: 6 units of Philosophy and/or Psychology. [3-0; 0-0]

427. (1½) *Philosophy of Psychology: B.*—For description, see Philosophy 426. Prerequisite: Philosophy 426. [0-0; 3-0]

430. (6/9)**c** *Honours Tutorial, Fourth Year.* [0-1; 0-1]

434. (1½) *Topics in Philosophy of Science.*—Consideration of one of the following: probability and induction; foundations of measurement; theory construction. The topic will be announced in advance. Prerequisite: Philosophy 214 or 302 or 414. [3-0]

440. (3) *Space and Time.*—Examination of some of the philosophical consequences of scientific development for our conception of space and time. Such topics as: Are space and time continuous? Is motion always relative to another body? Does time flow? Is time irreversible? Prerequisite: Philosophy 250 or 350, or 6 units of Mathematics or Science. [3-0; 3-0]

450. (1½) *Philosophy of Language: A.*—Such topics as: predication, definite descriptions, performative utterances, semantic theory, and philosophical implications of recent developments in linguistics. Prerequisite: Philosophy 250 or 350. [3-0; 0-0]

451. (1½) *Philosophy of Language: B.*—For description, see Philosophy 450. [0-0; 3-0]

460. (1½) *Philosophy of Knowledge.*—Analysis of the concept of knowledge; problems of justifying our ordinary and basic empirical beliefs. Prerequisite: Philosophy 250 or 350. [3-0]

470. (1½) *Philosophy of Perception.*—The contribution of the senses to knowledge of the external world; problems about scepticism. Prerequisite: Philosophy 250 or 350. [3-0]

480. (1½) *Philosophy of Action.*—Such topics as: the explanation of human actions; the conditions of responsibility; freedom of the will; the domains of rational and moral appraisal; the category of action and the individuation of actions. Prerequisite: Philosophy 250 or 350. [3-0]

498-499. (1½/3)**c** *Directed Reading.*

500. (1½/3)**d** *Metaphysics and Epistemology.*

501. (1½/3)**d** *Moral Philosophy.*

502. (1½/3)**d** *Logic.*

503. (1½/3)**d** *Ancient Philosophy.*

505. (1½/3)**d** *Philosophy of Mathematics.*

506. (1½/3)**d** *Philosophy of Mind.*

507. (1½/3)**d** *Philosophy of Language.*

511. (1½/3)**d** *Aesthetics.*

513. (1½/3)**d** *Medieval Philosophy.*

514. (1½/3)**d** *Philosophy of Science.*

521. (1½/3)**d** *Political Philosophy.*

530-539. (1½) *Problems.*

549. (6) *Master's Thesis.*

593. (1½/3)**d** *Kant.*

649. *Ph.D. Thesis.*

Physical Education (School of Physical Education and Recreation, Faculty of Education)

**Additional fees are charged for these courses. See "Special Fees" P. 22.

161. (1½) *An Introduction to the Study of Sport.*—An introductory examination of classifications for leisure, play, games, contests, dance and sport, together with an examination of their relationships. [3-0]

163. (1½) *Biodynamics of Physical Activity.*—An introductory examination of the mechanical, anatomical and physiological bases of human physical performance. [2-2]

164. (1½) *Dynamics of Motor Skill Acquisition.*—An introductory examination of motor skill acquisition, the variables which influence the learning and performance of motor skills, and the relationship between skill acquisition and growth and development. [3-0]

201. (1) *Educational Gymnastics.*—An individualized approach to movement on floor and apparatus, performance and analysis.

202. (1) *Introduction to Artistic Gymnastics.*—Trampoline, tumbling, floor exercise and apparatus skills and routines, performance and analysis.

203. (1) *Conditioning Programs.*—Conditioning exercises, fitness assessment, adaptation of exercise programs, performance and analysis.

204. (1) *Modern Rhythmical Gymnastics.*—Individual and group exercises performed to music with and without hand equipment.

205. (1-3)c *Exercise Programs.*—Principles and techniques in the performance, evaluation, prescription and management of exercise programs for both normal and special populations. May not be taken for credit by B.P.E., B.R.E. or B.Ed. (Physical Education) students.

*PHED 206-229: Course Description—Fundamental skills and strategies, performance and analysis.

*206. (1) *Lacrosse.*

*207. (1) *Fencing.*

*208. (1) *Baseball.*

*209. (1) *Softball.*

*210. (1) *Basketball.*

*211. (1) *Ice Hockey.*—Skating skill required.

*212. (1) *Football.*

*213. (1) *Field Hockey.*

*214. (1) *Rugby.*

*215. (1) *Soccer, Speedball, Speed-a-way (women).*

*216. (1) *Soccer.*

217. (1) *Social Recreation.*—Program planning, performance and analysis.

218. (1) *Games, Contests, Relays.*—Individual, pair, team and group activities, performance and analysis.

*219. (1) *Volleyball.*

*220. (1) *Badminton.*

*221. (1) *Archery.*

222. (1) *Outdoor Activities.*—An introduction to skiing, orienteering, sailing, canoeing. Students are advised that there will be certain costs which they will have to assume; e.g. ski lifts.

*223. (1) *Wrestling.*

*224. (1) *Golf.*

*225. (½) *Bowling.*

*226. (1) *Tennis.*

*227. (1) *Curling.*

*228. (1) *Figure Skating.*—Minimal skating skill required.

*229. (1) *Squash, Handball, and Racquet Ball.*

230. (1) *Fundamental Aquatic Skills.*—Attainment of proficiency in swimming skills, with an emphasis upon survival and safety techniques. Prerequisites: Ability to swim 25 metres each of front crawl, backstroke, and sidestroke. **Note:** Credit will be given for only one of Physical Education 230 and 231. Students must take a screening test to enrol in Physical Education 230 or 231. Non-swimmers should register immediately for instruction at UBC Aquatic Centre.

231. (1) *Basic Lifesaving Skills.*—Water rescue techniques; resuscitation and other emergency procedures; attainment of a high level of proficiency in swimming strokes. Prerequisite: Physical Education 230 or Senior Swimmer Award (Red Cross) or satisfactory performance in screening test. See note for Physical Education 230.

**232. (1) *Skin and Scuba Diving.*—Basic diving principles and techniques and selection of equipment. Emphasis is given to water skills and safety. Prerequisite: Physical Education 231 or Bronze Medallion Award (R.L.S.S.C.).

233. (1) *Aquatic Supervision.*—Principles and performance skills appropriate to lifeguarding and other aquatic supervision. Prerequisite: Physical Education 231 or Bronze Medallion Award (R.L.S.S.C.).

234. (1½) *Operation of Aquatic Facilities.*—Principles and techniques of operating aquatic facilities and developing aquatic programs.

240. (1) *Dance Forms.*—Fundamental patterns and techniques common to traditional dance forms leading to basic composition and performance.

241. (1) *Contemporary Dance I.*—Fundamental techniques as a preparation for modern, ballet and contemporary dance. Emphasis is on the development of simple dance patterns involving rhythm and awareness of body alignment.

242. (1) *Ballroom Dance.*—Practical experience in the style and steps of selected ballroom dances.

243. (1) *Square Dance.*—Square and couple dances, performance and analysis.

244. (1) *Folk and Square Dance.*—Steps, dances and style characteristics of the folk dance of selected countries. Emphasis will be on the creative use of folk steps and patterns.

245. (1) *Contemporary Dance — Jazz.*—Techniques and dance patterns within the jazz idiom of contemporary dance. Emphasis is on movement with a characteristic type of coordination and response to the rhythm, timing and phrasing of selected music.

250. (1) *Track and Field I.*—Study of selected events; kinesiological principles; performance and analysis.

251. (1) *Track and Field II.*—A study of current techniques and training methods in competitive track events together with an examination of recommended teaching and coaching methods at various levels. In addition, practical experience is offered in the art of judging and organizing these events. Prerequisite: Physical Education 250.

252. (1) *Track and Field III.*—A study of current techniques and training methods in competitive field events together with an examination of recommended teaching and coaching methods at various levels. In addition, practical experience is offered in the art of judging and organizing these events. Prerequisite: Physical Education 250.

260. (1½) *Foundations of Physical Education.*—Physical Education as a profession; principles, nature and scope, objectives and their interpretations. For B.Ed. students only. [3-0]

261. (1½) *Sport in Canadian Society*—An historical and theoretical analysis of sport in Canadian society. Prerequisite: Physical Education 161 and completion of First Year. [3-0]

262. (1½) *Health I.*—An introduction to anatomy and physiology; body systems, growth and development. For B.R.E. and B.Ed. students only. [2-2]

290. (1) *Orienteering.*—A comprehensive coverage of the sport of orienteering and the development of a progression of skills through practical experience. [0-3]

300. (1½) *An Introduction to Professional Studies in Physical Education.*—An introduction to the profession of physical education, including its evolution, the responsibilities of professionals in physical education, and the relationship between theory and practice. Prerequisite: completion of Second Year. [3-0]

301. (1) *Advanced Educational Gymnastics.*—A problem-solving approach to gymnastic activities. Applied methods and techniques of individual and group instruction. Prerequisite: Physical Education 201.

302. (1) *Advanced Artistic Gymnastics.*—Olympic gymnastic events plus trampoline and related activities, teaching methods and organization of demonstrations and meets. Prerequisite: Physical Education 202.

330. (1) *Competitive Swimming.*—Skill development and analysis of competitive swimming strokes, starts, and turns; individual and team performance. Prerequisite: PHED 231 or Bronze Medallion Award (R.L.S.S.C.).

331. (1) *Synchronized Swimming.*—Skill development and analysis; individual and team performance. Prerequisite: Physical Education 231 or Bronze Medallion Award (R.L.S.S.C.).

332. (1) *Competitive Diving.*—Skill development and analysis; individual and team performance. Prerequisite: Physical Education 231 or Bronze Medallion Award (R.L.S.S.C.).

333. (1) *Water Polo.*—Skill development and analysis; game tactics; rules and adaptations of the game; individual and team performance. Prerequisite: Physical Education 231 or Bronze Medallion Award (R.L.S.S.C.).

340. (1½) *Dance and Society.*—Forms and functions of Dance in selected cultures.

341. (1) *Contemporary Dance II.*—Dance techniques, improvisation, composition. Prerequisite: Physical Education 241.

342. (1) *Ballroom Dance II.*—Variations, composition, performance and analysis. Prerequisite: Physical Education 242.

343. (1½) *Dance for Children.*—The development of dance from ages 3 to 12. Play, imagery and dance from representational to symbolic interpretation; assimilation of rhythm and movement patterns; the folk tradition; the growth of technical skill; fundamental elements of dance composition. Prerequisite: Physical Education 240. [2-2]

360. (1½) *Comparative Studies in Sport.*—Models of sport organization, programs and facilities in selected countries. Prerequisite: Physical Education 261 or 260 and completion of Second Year. [2-1]

361. (1½) *Introduction to Athletic Training.*—Recognition, prevention, and first aid treatment of common sports injuries. Laboratory sessions emphasize principles and techniques of basic protective taping and strapping. Prerequisite: Physical Education 391 or 262. [2-2]

362. (1½) *Adapted Physical Education.*—A study of the problems related to the physically handicapped and mentally retarded, to low fitness; to body mechanics; nutritional disturbances and other handicaps. Prerequisite: completion of Second Year. [2-2]

363. (1½) *Mechanics and Kinetics.*—An introduction to the physical laws of nature and an interpretation of those laws as applied to human movement observed in athletic skills. An examination of the biomechanical systems of the human body with respect to forces developed. An analysis of various specific athletic performances and an introduction to the research tools at kinesiology. Prerequisite: Physical Education 163 and 391 or Anatomy 390 (may be taken concurrently with Anatomy 390 or Physical Education 391). [2-2]

364. (1½) *Psychological Foundations of Sport and Physical Activity.*—An analysis of current issues, research and practical applications related to psychololgical theory and methods associated with sport and human movement. Prerequisite: Physical Education 164 or 260 and completion of Second Year. [3-0]

365. (1½) *Foundations of Coaching.*—Methods of athletic conditioning, planning the program, psychology of training and coaching, athletic evaluation. Prerequisite: completion of Second Year. [3-0]

366. (1½) *Movement Experiences for Young Children.*—The design and implementation of movement experiences for children in early childhood years. Prerequisite: completion of Second Year. [3-0]

368. (1½) *Motor Skill Learning and Performance.*—The principles of motor skill acquisition, application to learning and instruction in sport and physical activity programs. Prerequisite: completion of Second Year. [2-2]

369. (1½) *Instructional Analysis and Design in Sport and Physical Activity Programs.*—Instructional design and technologies applied to sport and physical activity programs. Prerequisite: Physical Education 368. [2-2]

370. (1½) *Introduction to Measurement in Sport and Physical Activity.*—An introduction to the theory and practice of physical fitness appraisal, motor skill evaluation and test construction relative to sport and physical activity. Prerequisite: completion of Second Year.

371. (1½) *Introduction to Statistics and Research Methodology.*—Descriptive statistics, norms, normal probability curve; concepts of correlation, reliability and validity; statistical inference. Principles of research methodologies used in the study of sport and physical activity. Prerequisite: Physical Education 370. [3-0]

380. (1½) *The Rise in Modern Sport and Physical Education.*—The development of modern sport and physical education, from 1800 to the present. Prerequisites: Physical Education 261 or 260 and completion of Second Year. [3-0]

381. (1½) *Sociological Aspects of Sport.*—An introduction to the sociology of sport. Selected aspects of sport will be examined in relation to their functions in modern society. Prerequisite: Physical Education 261 or 260 and completion of Second Year. [3-0]

382. (1½) *Meaning and Values in Sport.*—An analysis of the experience of sports activities. Prerequisite: Physical Education 261 and comletion of Second Year. [3-0]

383. (1½) *The Olympic Games: Ancient and Modern.*—Prerequisite: completion of Second Year. [3-0]

384. (1½) *Physical Growth and Motor Development.*—Characteristics of physical growth and motor development and their interrelationship to physical activity; factors affecting, and measurement of, physical growth and motor development. Prerequisite: Physical Education 164 and completion of Second Year. [3-0]

391. (3) *Human Functional Anatomy and Applied Physiology*—Human anatomical systems and their integration; special emphasis on the major body systems and their functioning in physical activities. Prerequisite: Physical Education 163 and completion of First Year. [2-2; 2-2]

400. (1½) *Planning Sport and Exercise Programs.*—Approaches to, and considerations in, the planning of sport and exercise programs, including goal selection, design, implementation, monitoring, evaluation, and innovation. Prerequisite: Physical Education 261, 300 and completion of Third Year. [3-0]

*Physical Education 402-450: Performance Analysis Courses. Study at an advanced level of factors which contribute to excellence in performance. e.g. Techniques, strategies and tactics, bio-mechanical factors, specific fitness levels, coaching procedures.

*402. (1) *Gymnastic.*—Prerequisite: Physical Education 302.

*410. (1) *Basketball.*—Prerequisite: Physical Education 210.

*411. (1) *Ice Hockey.*—Prerequisite: Physical Education 211.

*412. (1) *Football.*—Prerequisite: Physical Education 212.

*413. (1) *Field Hockey.*—Prerequisite: Physical Education 213.

*414. (1) *Rugby.*—Prerequisite: Physical Education 214.

*416. (1) *Soccer.*—Prerequisite: Physical Education 216.

*419. (1) *Volleyball.*—Prerequisite: Physical Education 219.

*423. (1) *Wrestling.*—Prerequisite: Physical Education 223.

*426. (1) *Badminton and Tennis.*—Prerequisite: Physical Education 220 and 226.

*428. (1) *Figure Skating.*—Prerequisite: Physical Education 228.

*430. (1-3)**d** *Performance Analysis in Aquatics.*—Performance analysis, training techniques, and coaching methods in Swimming, Synchronized Swimming, Diving, and Water Polo. **Note**: Each sport will be the subject of a separate course on a rotating basis. Prerequisite: For Swimming, Physical Education 330; for Synchronized Swimming, Physical Education 331; for Diving, Physical Education 332; for Water Polo, Physical Education 333.

441. (1) *Contemporary Dance III.*—Further development of technique, improvisation and choreography. Prerequisite: Physical Education 341.

448. (1½) *Dance Composition.*—This course is designed to heighten the students' critical awareness of the dancer in action and develop an understanding of technical, aesthetic and creative aspects of dance composition. Prerequisite: Physical Education 341. [2-2]

*450. (1) *Track and Field.*—Prerequisite: Physical Education 251 or 252.

455. (1½) *Directed Field Studies.*—Provides opportunities to receive practical experience in choice of various areas within the physical education field. Prerequisite: completion of Second Year.

456. (1½) *Directed Studies Abroad.*—A program of lectures, seminars, visits and directed study of selected topics on site in a foreign country. Prerequisite: Consent of instructor. Credit may only be obtained for one of Physical Education 456 and Recreation 456.

460. (1½) *Administrative Practices in Physical Education and Athletics.*—A study of the problems relating to the organization and administration of physical education programs. Prerequisite: completion of Third Year. [3-0]

461. (1½) *Prevention of Sports Injuries I.*—Training and safety strategies for the prevention of injuries to the musculoskeletal system and sense organs. Prerequisite: Physical Education 361; Physical Education 363; and Physical Education 391; Corequisite: Physical Education 463 taken concurrently. [2-2]

462. (1½) *Health II.*—Current problems in health education with selection determined by needs of the students — social hygiene, habit-forming substances, communicable and non-communicable diseases. Prerequisite: Physical Education 262 or 391 or Anatomy 390.

463. (1½) *Physiology of Exercise.*—Study of the acute and chronic effects of exercise on body systems; and relationship of the functional capacity of individual systems to maximal human performance. Prerequisites: Anatomy 390 and Zoology 303 or Physical Education 391. [2-2]

464. (1½) *Health III.*—The organization and administration of health in the school and community; methods, materials and techniques of health instruction. Prerequisite: Physical Education 462 which may be taken concurrently. [3-0]

467. (1½) *Physical Education for the Mentally Retarded.*—A study of the physical activities and programs appropriate for the mentally retarded of all ages and all levels of retardation. The course includes an orientation to the field of retardation on an interdisciplinary basis, and opportunities for practical experience working with the retarded in a variety of situations in physical education settings. Prerequisite: completion of Second Year.

468. (1½) *Human Motor Performance.*—An analysis of the current research material and theory concerning motor performance and learning of man. Emphasis is placed on the concept of man as a component system. Prerequisite: completion of Second Year. [2-2]

469. (1½) *Exercise Management.*—Principles and methods of conducting exercise classes for adults with application of relevant concepts derived from sports medicine, tests and measurements, motor learning and exercise physiology. Prerequisites: Physical Education 463 and 370 which may be taken concurrently. [3-0]

471. (1½) *Prevention of Sports Injuries II.*—Training and safety strategies for the prevention of injuries or disorders of internal organs and central nervous system. Environmental and nutritional factors in conditioning and pre-event preparation. Prerequisite: Physical Education 461.

473. (1½) *Human Biomechanical Analysis.*—Advanced quantitative analysis of human motion. Prerequisite: Physics 110 or Physical Education 363.

489. (1½/3)**d** *Seminar* —Current topics and research in specific areas. Prerequisite: completion of Third Year. [3-0; 3-0]

499. (1½) *Projects in Physical Education.*—Provides opportunities to perform research pertaining to a chosen area of physical education. Prerequisite: completion of Third Year.

500. (1-3)**c** *Graduate Seminar.*

530. (1-3)**c** *Directed Studies.*
Topics selected by the student, with the approval of the Chairman of Graduate Studies, can be studied under the supervision of a member of the faculty.

551. (1½) *Mathematical Applications in the Study of Sport and Physical Activity.*—A selection of topics from: Stochastic models applied to the study of motor learning, involvement in sport, socialization through sport, etc., the assessment of change; analyses of scoring systems and playoff procedures used in various sports; game theory.

560. (1½) *Models of Sport Organization.*—An analysis and comparison of models of sport organization in selected countries. Prerequisite: Physical Education 360.

562. (1½) *Bioenergetics of Physical Activity.*—Basic energy systems of the human body; primarily concentrating on the bioenergetics of the skeletal muscle cell, recovery from muscular work, substrate utilization, muscle fiber types, strength, endurance and the physiological assessment of maximal performance. Prerequisite: Physical Education 463.

563. (1½) *Measurement of Human Motion.*—A critical evaluation of research tools used to measure and assess human motor performance including electromyographs, anthropometry, ergometers, indirect calorimetry, cinematography, and indirect dynamics. Prerequisite: Physical Education 363.

564. (1½) *Psycho-Social Aspects of Physical Activity.*—Selected psycho-social considerations in sport: initial and continuing involvement in the competitive sport environment. Prerequisites: Physical Education 364, Psychology 308.

565. (1½) *Physiological Aspects of Physical Activity.*—Survey of research regarding the physiological aspects of activity; the effects of altitude and environmental temperature on man's performance in exercise and sports. Prerequisite: Physical Education 463.

567. (1½) *Human Motor Performance.*—Processes underlying man's ability to learn and perform motor skills. Prerequisite: Physical Education 468.

568. (1½) *Seminar in Human Motor Performance.*—Reports and discussions of research literature concerning theories and findings in human performance. Special emphasis is given to understanding the basic mechanisms underlying motor performance within the framework of man as a component system.

570. (1½) *Research Methods in Physical Education.*—Research methods applied to the study of sport and physical activity, the nature of scientific inquiry, the design of experiments, the survey as a research medium, the historical and philosophical methods of inquiry, the writing of the research report.

571. (1½) *Developmental and adapted Physical Education.*—The theory and practice of adapted physical education. Programs of general class activities, special adaptive physical education and recreation for the disabled, handicapped and aged. The laboratory period affords practical experience in individual and group methods for conducting developmental conditioning and corrective exercises. Prerequisite: Physical Education 362.

573. (1½) *Seminar in Mechanical Analysis of Human Movement.*—An investigation of human movement using cinematographical and other research methods. The case study approach will be used to examine kinesiological concepts and principles.

580. (1½) *Seminar in Current Problems in Physical Education and Sport.*— Objectives; programs; leadership; history and trends; professional status; community organizations and auspices; attitudes and philosophy.

581. (1½) *Seminar in the Sociological Aspects of Sport.*—The interrelationships between sport and primary social units, basic social institutions, fundamental social processes and social problems. Prerequisite: Physical Education 381.

582. (1½) *Seminar in Canadian Sport History.*—Selected topics in Canadian sport history; emphasis on the twentieth century. Prerequisite: Physical Education 380.

583. (1½) *Physical Education Programs.*—The development of curricula in physical education; relationships of programs in schools, community centres and other institutions.

584. (1½) *Physical Growth and Motor Development.*—The process of human physical growth and the relationship between growth/maturation and physical activity: sequential development of locomotor and manipulative skills and the application of critical period/optimal period literature to developmental skills. Prerequisite: Physical Education 384.

585. (1½) *Coaching Science I.*—The application of research findings from exercise physiology, human growth and motor development, biomechanics and sport medicine, to the coaching of athletes. Prerequisite: Physical Education 365.

586. (1½) *Coaching Science II.*—The application of research findings from sport psychology, sport sociology and human motor learning, to the coaching of athletes. Prerequisite: Physical Education 365.

598. (1½) *Directed Field Studies in Sport and Physical Activity Agencies.*

599. (3/6)**c** *Master's Thesis.*

Physics (Faculty of Science)

NOTE: Physics 110, 115 or 120 is the normal prerequisite for admission to science programs and to the Faculty of Applied Science, and, along with Mathematics 100 and 101, is prerequisite to all Physics courses except Physics 340 and 341. Physics 110 is open to students who have completed Physics 11 whereas Physics 115 is open to students who have completed Physics 12. Physics 120 requires Physics 12 plus approval of a Physics Departmental adviser. Transfer students with one year of Physics carrying non-science credit from another institution should register in Physics 115 to continue in Science.

**For Students in the Faculty of Applied Science.*

****Additional fees are charged for these courses.** See "Special Fees" P. 22.

110. (3) *Mechanics, Electricity and Atomic Structure.*—The motion of particles and rigid bodies; work and energy, general wave motion, physical optics, electricity, magnetism, atomic spectra, waves and elementary particles; laboratory work emphasizing techniques of obtaining, treating and interpreting data applied to mechanics, electricity, optics and radioactivity. Prerequisite: Physics 11. Mathematics 100 and 101 (or 120 and 121) must precede or be taken concurrently with Physics 110. The course is not intended for students who have received credit for Physics 12 or an equivalent course; such students will not normally receive academic credit for Physics 110. [3-2-1; 3-2-1]

115. (3) *Wave Motion, Mechanics and Electricity.*—Wave motion, sound and light; Newtonian mechanics of particles and rigid bodies; electricity and magnetism; atomic structure; laboratory exercises in the fields of mechanics, optics, electricity and radioactivity. Prerequisite: Physics 12. Mathematics 100 and 101 (or 120 and 121) must precede or be taken concurrently with this course. [3-3-0; 3-3-0]

**120. (3) *Wave Motion, Mechanics, and Electromagnetism.*—Wave motion with applications to light and sound; an introduction to the special theory of relativity; particle motion under the action of various kinds of forces; conservation of energy and momentum; direct current, magnetic forces and fields, magnetic induction; laboratory investigations emphasizing the use of electrical instruments. Prerequisites: Excellent performance in Physics 12 and Mathematics 12, plus permission of a Physics Department adviser at Registration. Mathematics 100 and 101 (or 120 and 121) must precede or be taken concurrently with Physics 120. [3-3-0; 3-3-0]

140. (3) *Man's Energy Sources.*—Some physical concepts involved in energy in its various forms—mechanical, acoustical, electrical, nuclear, chemical and thermal energy. Conservation of energy. Heat and the laws of thermodynamics. Impact of man's energy sources. Not for credit in the Faculty of Science. Credit will be granted for only one of Physics 110, 115, 120, 140. [3-0-1; 3-0-1]

*150. (2) *Thermodynamics and Wave Phenomena.*—Temperature, heat and work, heat transfer, kinetic theory, processes in ideal and real gases, heat engine cycles, evaporation and refrigeration, entropy and the Second Law of Thermodynamics. Oscillations, waves in elastic media, sound waves, geometrical optics, wave optics, interference, diffraction. Prerequisite: Physics 12. [4-3-0; 0-0-0] or [0-0-0; 4-3-0]

*156. (1½) *Heat and Thermodynamics.*—Thermometry; thermal properties of matter; heat transfer by conduction, convection and radiation; kinetic theory of gases and gas laws; heat engines; refrigeration; change of state; first and second laws of thermodynamics. Prerequisites: Physics 110, 115 or 120 and Mathematics 101 (154). [2-3*-1; 0-0-0]

*170. (1½) *Statics.*—Statics of particles; rigid bodies, equilibrium of rigid bodies; distributed forces; analysis of trusses, frames and machines; forces in beams and cables; introduction to stress and strain; friction. Emphasis is placed throughout on the analysis of practical mechanics problems using free-body diagram techniques. Prerequisite: Physics 12. [3-0-2; 0-0-0]

*175. (1½) *Dynamics.*—Kinematics and kinetics of particles; kinematics of rigid bodies; plane motion of rigid bodies. Emphasis is placed throughout on the analysis of practical mechanics problems using free-body diagram techniques. Prerequisite: Physics 170. [0-0-0; 3-0-2]

200. (1½) *Relativity and Quanta.*—Special relativity: Lorentz transformation, dynamics and conservation laws. Quantum Physics: the experimental evidence for quantization; a qualitative discussion of the concepts of quantum mechanics and their application to simple systems of atoms and nuclei. Intended for 2nd year Honours or upper year Major students. Prerequisite: Physics 110, 115 or 120. [3-0-0; 0-0-0]

203. (1½) *Thermal Physics I.*—Laws of thermodynamics. Thermodynamic potentials. Applications to homogeneous and inhomogeneous equilibrium systems with particular reference to electric and magnetic systems. Non-equilibrium systems. Intended for Honours students. Prerequisites: 2nd class standing in 1st year Physics or permission of the Head. Corequisite: Mathematics 200. [2-3-0; 0-0-0]

206. (1½) *Mechanics.*—Selected topics in classical mechanics including Kepler's problem, non-inertial reference frames and Lagranges's equation of motion. Intended for Honours students. Prerequisites: Second Class standing in First Year Physics or permission of the Head. Mathematics 200. Corequisite: Mathematics 221. [0-0-0; 3-0-1]

209. (1½) *Intermediate Experimental Physics.*—The response of RLC circuits to sinusoidal and transient signals; an introduction to digital electronics. Intended for Honours students. Prerequisite: Second class standing in First Year Physics or permission of the Head. Corequisite: Mathematics 315. [0-0-0; 2-3-0]

213. (2) *Thermodynamics.*—The laws of Thermodynamics, thermodynamic potentials, phase changes, kinetic theory of gases, thermal properties of matter, elementary statistical physics. Experiments in thermometry, thermal conductivity, specific heats, and vapour pressures. Prerequisites: Physics 110, 115 or 120; Mathematics 200 (may be taken concurrently). [3-3-1; 0-0-0]

215. (2) *Electricity.*—Elements of DC and AC circuits, steady-state and transient response, resonant circuits, complex vector representation of sinusoidal quantities. Experiments in voltage, current and impedance measurements; RC, RL, and RCL circuits, coupled oscillators. Prerequisite: Physics 110, 115 or 120; Mathematics 200 (may be taken concurrently). [0-0-0; 3-3-1]

216. (2) *Mechanics and Special Relativity.*—Classical mechanics in inertial frames of reference. Non-inertial frames. Relativistic kinematics and dynamics of particles. Prerequisites: Physics 110 or 115; Mathematics 200 and 221 (may be taken concurrently). [2-0-1; 2-0-1]

230. (1) *Twentieth-Century Physics.*—A survey of one of the following fields of modern physics: foundations of physics; elementary particles and their role in the Universe; radio astronomy; physics of the atmosphere and ocean; energy sources. Prerequisites: Mathematics 100 and one of Physics 110, 115, 120. [2-0-0; 0-0-0]

231. (2) *Optics and Electromagnetism.*—Reflection and refraction of light at plane and spherical surfaces; interference and diffraction; polarization; electric and magnetic fields; magnetic properties of matter; DC and AC circuits. Prerequisities: Physics 110, 115 or 120; Mathematics 200 and 221 (may be taken concurrently). Physics 239 should be taken concurrently. [2-0-1; 2-0-1]

236. (1½) *Mechanics and Heat.*—Newton's Laws, conservation of energy and momentum, circular and rotational motion, elasticity. fluids, temperature, heat transfer, gas laws, heat engines. For students in the Faculty of Forestry. This course is not for credit in the Faculty of Science. Prerequisites: Physics 170 and Mathematics 101 or permission of the Head. [0-0-0; 3-1-0]

239. (1) *Laboratory in Optics and Electromagnetism.*—For students in Physics 231, which must be taken concurrently. [0-3-0; 0-3-0]

*250. (2) *Introduction to Modern Physics.*—Wave particles duality of matter; processes in atomic, nuclear and solid state and introduction to quantum mechanical measurement devices and techniques. Prerequisite: Physics 150. [0-0-0; 3-3-1]

*251. (2) *Electric and Magnetic Fields.*—Introduction to electric and magnetic fields, wave properties, optics and basic a/c and d/c circuits, leads to Maxwell's equations. Prerequisite: Physics 150. [3-3-1; 0-0-0]

*252. (1) *Introduction to Electric and Magnetic Fields.*—Coulomb's law, electric field, capacitance, dielectrics, electric current, conductivity in metals and semiconductors, magnetic field, Faraday's law, magnetic materials, electromagnetic radiation. Students who have completed Physics 115 or 120 are exempt from Physics 252. Prerequisite: Physics 150. [2-0-1; 0-0-0]

**298. (0) *Work Placement I.*—Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the winter term of the second year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. Prerequisites: Physics 200, 203.

**299. (0) *Work Placement II.*—Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the summer following the second year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. Prerequisite: Physics 298.

301. (1½) *Electricity and Magnetism.*—Electrical fields and potentials of static charge distributions, current, fields of moving charges, magnetic field, electromagnetic induction, Maxwell's equations. Intended for Honours students. Prerequisite: Physics 209. [3-0-1; 0-0-0]

303. (1½) *Thermal Physics II.*—Ensemble theory, application to classical and quantum gases. Boltzmann equation. Intended for Honours students. Prerequisites: Physics 203, Mathematics 200. [3-0-0; 0-0-0]

304. (1½) *Introduction to Quantum Mechanics.*—The beginnings of Quantum Mechanics, Wave Mechanics and Schroedinger's Wave Equation, one dimensional potentials, the postulates of Quantum Mechanics, applications to three dimensional systems. Prerequisite: Mathematics 315, Physics 200. [0-0; 3-0]

305. (1½) *Introduction to Biophysics.*—An introduction for physicists (assumed to have no background in biology) to the basics of molecular biology, followed by selected examples where insights from physics and mathematics have helped solve important biological problems. Intended for students with 3rd or 4th year standing in physics. Not for credit for students in the Life Sciences. [3-0-0; 0-0-0]

306. (1½) *Theoretical Mechanics.*—Analytical mechanics of particles and rigid bodies. Lagrangians and Hamiltonians, Hamilton-Jacobi theory. Intended for Honours students. Prerequisite: Physics 206. [0-0-0; 3-0-0]

**307. (1) *Optics Laboratory.*—Selected experiments in optics. To be taken concurrently with or following Physics 308. [0-3-0; 0-3-0] or [0-0-0; 0-6-0]

308. (1½) *Optics.*—Geometrical optics: paraxial theory, including matrix methods. Physical optics: interference, diffraction, polarization, Fourier optics, Abbe Theory and modern applications. Prerequisite: Physics 301 or 311. [0-0-0; 3-0-0]

309. (2) *Honours Electrical Laboratory.*—Selected experiments in electricity, magnetism and electronics for Honours students. Prerequisite: Physics 209 or Physics 215 or equivalent. [2-3-1*; 0-3-1*]

311. (2) *Electricity and Magnetism.*—Properties of the electromagnetic field using the concepts of divergence, gradient and curl; dielectric and magnetic materials; Maxwell's Equations and applications. Prerequisites: One of Physics 215 or 231 or Geophysics 221; Mathematics 200. [2-0-1*; 2-0-1*]

312. (1½) *Introduction to Mathematical Physics.*—The application of ordinary and partial differential equations to physical problems; boundary and initial value problems associated with heat, wave and Laplace equations. Fourier analysis; expansions in Bessel and Legendre functions. Corequisite: Mathematics 315 (First Term) or Mathematics 301. [0-0-0; 3-0-0]

314. (2) *Fluids and Solids.*—Static and flow properties of liquids and gases, including laminar, turbulent and molecular flows. Elastic properties of solids. Point defects and dislocations. Prerequisite: Mathematics 315 or 301 (may be taken concurrently). [2-0-0; 2-0-0]

**319. (1) *Electrical Laboratory.*—Selected experiments in electromagnetism; amplification and feedback; operational amplifiers; digital logic. Prerequisite: Physics 215 or Geophysics 221. [0-3-1*; 0-3-1*]

326. (3) *Optics, Vibrations and Acoustics*.—Application of waves to the human environment. Photometry; illumination; colour geometrical optics; vibrations; sound waves; noise, architectural acoustics. Prerequisite: Physics 110, 115 or 120; Mathematics 315. [3-3*-0; 3-3*-0]

329. (1½) *Physical Measurement Techniques*.—Basic physics concepts and contemporary instrumentation in a wide range of measurements (temperature, humidity, length, strain, pressure, radioactivity, etc.), with attention to precision and to treatment and analysis of signals. Includes discussion of circuits and of low temperature, vacuum, nuclear and optical techniques. Prerequisites: Physics 110, 115 or 120; Mathematics 100 and 101 (or 120 and 121). [0-3-1; 0-3-1]

340. (3) *Elements of Physics*.—A survey of the conceptual framework of physics for non-scientists who wish to master new paradigms and imagery. Mathematical language and problem-solving are de-emphasized. Topics include: classical laws of motion, gravitation, electromagnetism, relativity, quantum mechanics, elementary particles and "current events" in physics. Prerequisite: full standing in the Second or higher Year. Not for credit in the Faculties of Science or Applied Science. [3-0-0; 3-0-0]

341. (1½) *Physics of Music*.—An introduction to the physical principles important to the production, transmission and perception of musical sounds. The treatment will be non-mathematical; with emphasis on demonstrations. Topics may include the description of sound waves, resonances, scales, physics of hearing, examination of specific musical instruments, etc. Not for credit in the Faculties of Science and Applied Science. [3-0-0; 0-0-0]

349. (1-3)**c** *Directed Studies*.—With approval of the Head of the Physics Department, studies under the direction of a staff member may be arranged.

*350. (1) *Quantum Mechanics I*.—Postulates of Quantum Mechanics, Schrodinger Equation, Dirac notation, barrier and tunneling phenomena, the hydrogen atom. [0-0-0; 2-0-0]

*351. (1½) *Applied Electromagnetic Theory*.—Maxwell's equations, magnetic materials, wave guides, radiation and antennae. [3-0-2; 0-0-0]

*352. (1) *Laboratory Techniques in Physics*.—Must be taken concurrently with Physics 351. Some of the experiments will be based on the lecture material for Physics 351. Other techniques and subjects will be covered. [0-3-0; 0-0-0]

*353. (1½) *Introduction to Atomic Physics*.—Electrons, photoelectric effect, Compton effect, the Bohr atom, X-rays, Zeeman effect, De Broglie, Schroedinger equation, the hydrogen atom, electron spin and spectroscopy. Primarily for Electrical Engineering students. [3-0-0; 0-0-0]

*398. (1) *Technical Report*.—A technical report preferably based on summer work and at least 2000 words long to be submitted to the Department by November 15.

**399. (0) *Work Placement III*.—Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the summer following the third year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. Prerequisite: Physics 299.

400. (1) *Introduction to Elementary Particle Physics*.—An introduction to the basic properties of elementary particles including the forces of nature. A discussion of the models used to describe these properties, i.e. quarks and symmetry groups. [2-0-0; 0-0-0]

401. (1½) *Electromagnetic Theory*.—The application of Maxwell's Theory to the propagation of electromagnetic waves. Prerequisite: Physics 201. [0-0; 3-0]

402. (1½) *Applications of Quantum Mechanics*.—Spin and angular momentum addition, perturbation methods, and applications in the fields of Atomic, Molecular, Nuclear, and Solid State Physics. Prerequisite: Physics 304. [3-0; 0-0]

403. (1½) *Statistical Physics*.—Laws of thermodynamics and statistical mechanics; applications to modern physics. Prerequisite: Physics 303. [3-0-0; 0-0-0]

405. (1½) *Radiation Biophysics*.—The physical and chemical interactions of ionizing and ultraviolet radiation and their biological effects at the cellular, tissue and whole animal levels. Topics in radiation dosimetry, radiation protection, and the treatment of malignant disease in humans will be included. Prerequisite: Fourth Year standing in Science, or permission of the Head of the Department. [0-0-0; 3-0-0]

406. (1) *Continuum Mechanics*.—Mechanics of deformable bodies; equations of motion; stress and strain tensors. Basic concepts for solids and liquids with elements of nonlinear mechanics applicable to macromolecular structures such as polymeric materials and biological tissues. Prerequisite: Physics 206 or 216 and Mathematics 316 or Physics 312. Credit may be obtained for only one of Physics 406 and Geophysics 320. [2-0-0; 0-0-0]

407. (1) *Physics of Solids*.—An introduction to the fundamentals of modern solid state physics, including crystal structure and electronic properties of metals and semiconductors. Prerequisite: Physics 304 or Physics 412. [0-0-0; 2-0-0]

408. (1) *Fluid Flow*.—Subsonic flow of viscous and non-viscous fluids. Boundary layers. Laminar and turbulent flow. Supersonic flow and shock waves. Prerequisite: Physics 406. [0-0-0; 2-0-0]

409. (1-3)**c** *Experimental Physics*.—A laboratory course with a wide choice of experiments for fourth year Honours and Major students. Topics include solid state, nuclear, classical, quantum, electromagnetic and low temperature physics. For 3 units, two weekly laboratory periods and completion of a project in second term are required. Prerequisite: Physics 309 or 319. [0-6-0; 0-6-0]

411. (1½) *Electrodynamics*.—Maxwell's equations with emphasis on applications to guided waves, antennas, superconductivity, plasmas and other electromagnetic phenomena of current interest. Prerequisite: Physics 201 or 311. [3-0-0; 0-0-0]

412. (1½) *Atomic Physics*.—The major phenomena in the fields of atomic physics. Prerequisite: Physics 200 and Mathematics 315. [3-0-0; 0-0-0]

414. (1½) *Radioactivity/Nuclear Physics*.—A survey of basic concepts of nuclear physics with applications in power, medicine, geology, industry, archaeology, cosmology. Prerequisites: At least 3 units of Physics courses; Mathematics 315. [0-0-0; 3-0-0]

421. (1) *Physics of the Atmosphere*.—Selected applications of thermodynamics and fluid dynamics to atmospheric phenomena including clouds, wind and pressure systems.

440. (3) *Recent Developments in Physics*.—This course is available for credit only in the Faculty of Education. It consists of lectures and demonstrations intended to review the latest developments in physics. Offered in some Summer Sessions only. [3-0-0]

449. (3) *Honours Thesis*.—A research project, undertaken under the direction of a faculty member culminating in a thesis.

*452. (1½) *Quantum Mechanics II*.—Spin angular momentum, Pauli spin matrices; addition of angular momenta; spin-orbit interaction; perturbation theory; Zeeman, Stark effects, optical transitions, magnetic resonance and other applications; multielectron atoms; Hartree Fock; molecules; symmetries. [0-0-0; 3-0-0]

*453. (2) *Applied Nuclear Physics*.—Radioactive decay and radiations, nuclear properties, interactions of neutrons, physical principles of power reactors, nuclear fusion, radiation monitoring and safety. [3-0-0; 0-0-1*]

*454. (1½) *Applied Solid State Physics*.—Symmetry of crystal structures, waves in lattices, band theory, statistics, effective mass approximation, electrical conduction in metals and semiconductors, superconductivity and applications. [0-0-0; 3-0-0]

*455. (1½) *Thermodynamics and Statistical Mechanics*.—An introduction to classical and quantum statistical mechanics. Application of these relationships to thermodynamics, and to systems of varying complexity from the simple ideal gas to the degenerate gas. [0-0-0; 3-0-0]

*456. (1½) *Applications of Classical Mechanics*.—Lagrange's equations: applications to electromechanical systems, Variational methods: Hamilton's principle, two body central forces: planetary motion, astronautics, nuclear scattering, rigid body dynamics: inertia tensor, inertial ellipsoid, Euler's equations, application to the motion of the earth and inertia navigation; small oscillations: normal modes, free and forced oscillations with friction, molecular vibrations; Hamilton's equations: applications to planetary and accelerator orbits; Liouville's theorem; applications to statistical mechanics and beams of charged particles and light. [3-0-0; 0-0-0]

*458. (2) *Applied Optics*.—Basic applications of lasers, geometrical optics, fibre optics, diffraction, and Fourier optics. [3-3-0; 0-0-0]

*475. (1½) *Introduction to Statistical Mechanics*.—Review of thermodynamics, fundamentals of statistical mechanics and its relation to classical thermodynamics; applications to thermal, magnetic and electrical properties of matter. Primarily for Electrical Engineering students. [0-0-0; 3-0-0]

*477. (1½) *Applied Plasma Physics*.—Introductory treatment, with emphasis on applications. Properties of equilibrium plasmas. Measurement techniques. Astrophysical plasmas. Laboratory devices, including gaseous lasers. Thermo-nuclear fusion. [0-0-0; 3-0-0]

**498. (0) *Work Placement IV*.—Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the fall term of the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. Prerequisite: Physics 399.

**499. (0) *Work Placement V*.—Approved and supervised technical work experience in an industrial research setting for a minimum of 3.5 months. Normally taken during the summer following the fourth year. Technical report required. Restricted to students admitted to the Co-operative Education Program in Physics. Prerequisite: Physics 498.

500. (1½) *Elementary Quantum Mechanics*.—Non-relativistic quantum-mechanics with applications to atomic nuclear, and particle physics. Prerequisite: one of Physics 355, 402, 412.

501. (1½) *Intermediate Quantum Mechanics*.—Elementary field-theory techniques for many-body systems. The Dirac equation. Introduction to the quantum field theory of electrons and photons. Prerequisite: Physics 500.

502. (2) *Waves*.—The physics of dispersive wave propagation in continous media, with illustrations derived from a variety of physical systems and emphasis on recent discoveries on the behaviour of nonlinear waves.

503. (1) *Electromagnetic Fields in Matter*.—The classical theory of the interaction of electric fields with condensed matter. Prerequisite: Physics 401, 451 or 411.

504. (1½) *Classical Electromagnetism*.—Special relativity and the classical theory of electromagnetic fields. Prerequisite: Physics 401.

505. (2) *Nuclei and Particles*.—General properties of the nucleus, two-body problem at low energies, nuclear forces, nuclear models, nuclear reactions, interaction of nuclei with electromagnetic radiation, beta-decay. Properties of elementary particles, classification of interactions, intermediate and high energy reactions.

506. (2) *Quantum Theory of Solids*.—An elementary treatment of the theory of the structure and properties of solids: energy band method, lattice vibrations, phonon and electron transport, dielectric and magnetic properties, imperfections.

507. (2) *Plasma Physics*.—Equilibrium theory of ionized gases, kinetic theory, transport coefficients. Motion of individual charges, cyclotron radiation. Waves, Landau damping. Derivation of magnetohydrodynamic equations.

508. (2-3)**c** *Quantum Field Theory*.—The theory of quantized fields. Feynman diagrams and renormalization; quantum electrodynamics; calculation of fundamental processes; non-abelian gauge theories. Prerequisite: Physics 501.

509. (1-2)**d** *Theory of Measurements*.—Estimation of parameters from experimental measurements; maximum likelihood; least squares; tests of significance (x^2, etc.). Noise properties of common devices. Extracting signals from noise; signal averaging; auto and cross-correlation, etc.

510. (1) *Stochastic Processes in Physics*.—Statistical and thermodynamic fluctuations in electromagnetic, mechanical and thermal systems. Fundamental limits of observation and measurement in classical and quantum systems.

511. (1) *Advanced Magnetism*.—Spin Hamiltonian, theory of ferro- and antiferromagnetism, nuclear magnetic resonance, relaxation in spin systems. Prerequisite: Physics 506.

512. (1-2)**c** *Topics in Atomic and Molecular Spectroscopy.*—Prerequisite: Physics 501.

513. (1-2)**d** *Topics in Advanced Spectroscopy.*—Prerequisite: Physics 512.

514. (1-2)**d** *Classical Field Theory.*—Classical Field theory in flat space-time. Variational principles and conservation laws. Tensor fields and manifolds. The course is a preparation for study of relativistic gravitation and quantum field theory. Prerequisite: Physics 504.

516. (2) *Statistical Mechanics.*—Ensemble theory (classical and quantum mechanical). Fluctuations. Response to external perturbations. Non-equilibrium statistical mechanics. Prerequisites: Physics 356 or 403. Corequisite: Physics 500.

517. (1) *Introduction to Low Temperature Physics.*—Cryogenic techniques and instrumentation. Some aspects of superconductors and liquid helium.

518. (1) *Introduction to Superconductivity.*—Thermodynamics and electrodynamics. Josephson effect. Applications. Elements of microscopic theory.

521. (2) *Group Theory Methods in Quantum Mechanics.*—Selected topics from atomic, molecular, solid state, nuclear and elementary particle physics treated by group theory methods, Prerequisite: Physics 501.

522. (2) *Intermediate Energy Nuclear Physics.*—Selected topics in low and intermediate energy nuclear physics. Prerequisites: Physics 508 (may be taken concurrently), 505.

523. (1) *Advanced Electronics.*—Advanced treatment of problems in noise. Non-linear circuit theory and information theory.

524. (2) *Non-equilibrium Thermodynamics.*—Recent developments in thermodynamics, with special emphasis on the stability of systems far from equilibrium.

525. (1-2)**d** *Advanced Solid State Physics.*—Theories of the solid state, with emphasis on electronic phenomena. Prerequisites: Physics 501 and 506.

527. (1) *Theoretical Nuclear Physics.*—Selected topics from current nuclear theory. Prerequisites: Physics 501, 505.

528. (2) *Elementary Particle Physics.*—Selected topics in high energy physics. Prerequisites: Physics 508 (may be taken concurrently), 505.

529. (2) *Advanced Quantum Mechanics.*—Selected topics in relativistic quantum mechanics, quantum field theory, and theories of elementary particles. Prerequisites will depend on the topics to be discussed. Permission of the Department must be obtained.

530. (1-2)**d** *Topics in General Relativity Theory.*—Prerequisite: Physics 514.

531. (1) *Advanced Plasma Physics.*—Selected topics from current research in plasma physics—seminar course.

532. (2) *Plasma Dynamics.*—The magnetohydrodynamic formulation of plasma dynamics including the effects of diffusion, viscosity, thermal conduction and ionization phenomena on plasma motion.

533. (1) *Laser Physics.*—Interaction of EM-radiation with matter, Gaussian beams and optical resonators, laser oscillators, specific laser systems, amplification in laser media, the electro-optic effect.

534. (2) *Radiological Physics I.*—A systematic study of the principles involved in radiotherapy and of the techniques required for the application of these principles.

535. (2) *Radiological Physics II.*—A continuation of Physics 534, including an extension of the topics discussed in that course.

536. (1) *Advanced Radiation Biophysics.*—Interactions of radiation with matter in living cells. Description of events following ionizing irradiation; cell survival as a function of dose; survival models. Students will be expected to present a seminar on a pre-selected topic, and participate in class discussions.

544. (1) *Magnetic Resonance Seminar.*—Selected topics in the recent developments of the theory and applications of magnetic resonance.

545. (1) *Theoretical Physics Seminar.*—Selected topics from current literature.

549. (6) *Master's Thesis.*

555. (1-3)**c** *Directed Studies in Physics.*—With approval of the Head of the Department, advanced studies under the direction of a staff member may be arranged in special cases.

570. (1-2)**c** *Radio Astronomy.*—Emission, propagation and detection of radio noise from the solar system, galaxy and extragalactic radio sources.

571. (1) *Cosmic Physics.*—Reviews of radio, infra-red, optical, ultra-violet, X-ray, gamma ray and particle astronomy. Studies of interstellar matter. Developments in theories of gravitation and cosmology.

*599. *Thesis.*—For M.A.Sc. degree.

649. *Ph.D. Thesis.*

Physiology (Faculty of Medicine)

NOTE: Biology 101 or 102, Chemistry 110 or 120, 203 or 230, Mathematics 100 and 101 (or 120 and 121) and Physics 110, 115 or 120 are prerequisite to all courses in Physiology.

301. (3) *Human Physiology.*—A lecture course on body function with particular reference to mammalian and human physiology. Credit will normally be given for only one of the following: Physiology 301 and 303 or Zoology 303. Prerequisites: Biology 101 or 102 and Chemistry 203 or 230. [3-0; 3-0]

302. (1½) *Human Physiology Laboratory.*—A laboratory course designed to illustrate physiological principles and to provide training in physiological techniques. Must be taken in conjunction with Physiology 301. Enrolment limited. Available only to students in the Faculty of Pharmaceutical Sciences. [0-3; 0-3]

303. (1½) *Laboratory in Human Physiology (Honours).*—Techniques and principles of human physiology. This course must be taken in conjunction with Physiology 301. Restricted to Physiology and Pharmacology Honours students. [0-3; 0-3]

400. (8) *Human Physiology.*—A lecture and laboratory course on body function with particular reference to human physiology. The functions of muscle, nerve, metabolism, circulation, respiration, excretion, digestion, and the endocrines are dealt with. Enrolment limited to Medical and Dental students.

422. (1½) *Mammalian Cardiovascular and Respiratory Physiology.*—The control and integration of cardio-pulmonary function in mammals. Intended for Honours students in Physiology or other Life Sciences. Prerequisite: Physiology 301 and permission of Head of Department. [3-0; 0-0]

423. (1½) *Mammalian Renal and Gastrointestinal Physiology.*—Control of mammalian renal and gastrointestinal systems. Role in homeostasis. Intended for Honours students in Physiology or other Life Sciences. Prerequisite: Physiology 301 and permission of Head of Department. [3-0; 0-0]

424. (1½) *Mammalian Endocrinology.*—Hormonal control of homeostatic, metabolic and reproductive function. Intended for Honours students in Physiology or other Life Sciences. Prerequisite: Physiology 301 and permission of Head of Department. [0-0; 3-0]

425. (1½) *Elements of Neurophysiology.*—An introduction to the functions of the nervous system. Anatomy 425 must be taken concurrently. [2-3; 0-0]

426. (1½) *Physiological Basis of Central Nervous System Function.*—An integrated study of the structural and functional organization of the central nervous system with special emphasis on neurophysiological mechanisms. Prerequisite: Physiology 301 (or equivalent) and permission of Head. [0-0; 3-0]

430. (3) *Advanced Laboratory in Physiology.*—A laboratory course giving training in the methods, techniques and use of instruments required for physiological investigation. (Physiology 303 and the consent of the Department are required and enrolment will be limited.) [0-6; 0-6]

448. (1-3)**c** *Directed Studies in Physiology.*

449. (3) *Graduating Essay.*—Prior to graduation, students in the Honours course will be required to carry out an investigation approved by the Head of the Department and to submit a satisfactory graduating essay based on this work.

453. (1½) *Topics in Human Physiology.*—Students will study a selected topic under the supervision of a Faculty member. Topics will usually be areas of current interest in applied physiology. This course is designed as a basic science elective for third year medical students. Departmental approval is required.

510. (1½) *Sensory-motor Integration.*—Elements of structure and function of the central nervous system with special emphasis on mechanisms of sensory-motor integration. Intended for students registered in the M.Sc. program in the School of Audiology and Speech Sciences.

511. (1-3)**c** *Seminar in Mammalian Physiology.*

521. (1½) *Advanced topics in Renal Physiology.*

522. (1½) *Advanced topics in Cardiovascular Physiology.*

523. (1½) *Advanced topics in Gastrointestinal Physiology.*

524. (1½) *Advanced topics in Endocrinology.*

526. (1½) *Advanced topics in Neurophysiology.*

527. (1½) *Advanced topics in Respiratory Physiology.*

530. (1½) *Muscle Biophysics.*—A lecture and seminar course dealing with selected topics in muscle contraction at an advanced level. Prerequisite: ANAT 405 or equivalent. MATH 315 and 316 strongly recommended. [0-0; 2-1]

548. (1-3)**c** *Advanced Topics in Human Physiology.*

549. (6) *M.Sc. Thesis.*

649. *Ph.D. Thesis.*

Plant Science (Faculty of Agricultural Sciences)

Note: Admission to Plant Science 314, 406, 407, 408, 411, 412, 414, 417 and 418 requires credit for Plant Science 259 or permission of instructor.

**Additional fees are charged for these courses. See "Special Fees" P. 22.

110. (1½) *Principles of Landscape Horticulture.*—An introduction to the culture of plant materials used in the landscape, their growth and development. Effects of cultural practices and environmental factors. (Credit can be obtained for only one of Plant Science 110 and 259.) Not for credit towards the B.Sc. (Agr.) degree. [0-0; 3-0]

258. (1½) *Introduction to Seed Plant Taxonomy.*—Introduction to seed plant taxonomy emphasizing descriptive morphology and identification. Each student will be required to submit a plant collection. (Same as Botany 311.) [2-3; 0-0]

259. (1½) *Introduction to Plant Science.*—Introduction to the growth, development and utilization of cultivated plants. Influences of climate, soil, weeds, diseases and pests; cultural practices and systems; plant improvement. [0-0; 3-0]

304. (1½) *Introduction to Range Management.*—Ecology and management of rangeland. [2-2; 0-0]

314. (1½) *Plant Propagation.*—Principles and practices of propagation of woody and herbaceous plants with emphasis on the production of nursery stock. (Offered in alternate years). [3-2; 0-0]

315. (1½) *Herbaceous Plants in the Landscape.*—Culture and identification of herbaceous plant materials and their use in the landscape. (Suitable for students of other faculties and departments interested in landscape materials and their uses.) Prerequisite: Plant Science 259 or 110 or equivalent strongly recommended. [2-2; 0-0]

316. (1½) *Trees and Shrubs in the Landscape I.*—Culture and identification of landscape materials with emphasis on woody plants. Elementary principles of landscape composi-

tion. (Suitable for students of other faculties and departments interested in landscape materials and their uses.) [2-2; 0-0]

320. (1½) *Field Studies and Practices in Agronomy, Horticulture, Crop Protection or Range Science*.—Summer field work under the direction of an approved plant scientist, supported by a report relative to some phase of the field operation. Permission of Head of the Department.

321. (1½) *Biometrics*.—Elementary principles of the analysis, presentation and interpretation of biological data. Prerequisite: First year Mathematics. [3-2; 0-0]

322. (1½) *Design of Experiments*.—Practical problems and discussion of experimental design and interpretation. Prerequisite: Plant Science 321 or equivalent. [0-0; 3-2]

**324. (1½) *Physiology of Crops I*.—Introduction to physiological processes in plants of economic importance. Assimilation and metabolism of carbon, mineral nutrients and water; relationships between plant structure and function. Credit can be obtained for only one of Plant Science 324 and 325 or Botany 330. [3-2; 0-0]

325. (1½) *Physiology of Crops II*.—Analysis of crop growth and development. Control of crop yield by environmental conditions and chemical growth regulators. Prerequisite: Plant Science 324. [0-0; 2-2]

326. (1½) *Methods of Plant Analysis*.—A practical course in the techniques of modern plant analysis; sample preparation; methods of analysis for inorganic and organic constituents. Prerequisite: Chem. 230. [0-0; 1-4]

331. (1½) *Economic Entomology*.—Identification, morphology and development of insects; general principles. Effects of insects on the economic pursuits of man; beneficial insects; insect pests (damage and control measures). A collection of 100 species of insects is required. Credit will not be granted for both Plant Science 331 and Zoology 311. [2-3; 0-0]

**336. (1½) *Introductory Plant Pathology*.—Study of the ecology of plant pathogenic organisms; principles of disease development and control. [3-2; 0-0]

**338. (1½) *Weed Science*.—Importance, identification, dissemination and biology of weeds; preventive, cultural, biological and chemical methods of control. Plant Science 258 must precede or be taken concurrently. [3-2; 0-0]

400. (1½) *Field Course in Horticulture*.—Current practices in horticulture (ornamental, vegetable, greenhouse and fruit production) through field trips. To be taken between third and fourth years. Written reports will be required. A fee will be charged. Enrolment limited. Permission of the Head of the Department.

401. (1½) *Field Studies in Rangeland Resources*.—Applications of rangeland management techniques and principles. Offered between third and fourth years. Prerequisites: PLNT 304/FRST 328. Enrolment limited. A fee may be charged.

404. (1½) *Ecology and Management of North American Range Plant Communities*.—Major range communities, their plant species, plant succession, climax vegetation, and the impact of grazing animals. Prerequisite: Plant Science 304. [2-0-2; 0-0]

405. (1½) *Rangeland Systems*.—History, development, structure, and utilization of rangeland systems throughout the world. Methods of rangeland assessment. Prerequisite: Plant Science 404. [0-0; 2-2]

406. (1½) *Field Crops*.—Factors associated with classification, yield and quality of temperate zone agronomic crops used for food, oil and fibre. Prerequisite: Plant Science 259 and Soil Science 200, or permission of instructor. (Offered in alternate years). [0-0; 2-2]

407. (1½) *Tropical and Specialty Temperate Crops*.—Production and characteristics of important tropical crops and review of some temperate specialty crops of interest to Canadian consumers (Offered in alternate years.) [2-2; 0-0]

408. (1½) *Forage Agronomy*.—Management, production, conservation and utilization of agronomic crops used primarily for forage; seed production technology; the use of agronomic and native species in revegetation, reclamation and reforestation. Prerequisites: Plant Science 259 and Soil Science 200, or permission of instructor. (Offered in alternate years.) [0-0; 2-2]

411. (1½) *Small Fruit Culture*.—Technical and practical developments in the production of berry crops, with emphasis on species of commercial importance in Canada. Cultivars, propagation, management, harvesting. Normally restricted to fourth year students. [2-2; 0-0]

412. (1½) *Tree Fruit Production*.—Technical and practical aspects of orchard development and management in colder regions. Soil management, fertilizers, propagation, tree training, pruning, fruit thinning, harvesting. Cultivars and their improvement. Normally restricted to fourth year students. [0-0; 2-2]

413. (1½) *Plant Breeding*.—Genetic basis and methodology of breeding for improved crop and ornamental plants and the maintenance of desired forms. Prerequisite: Plant Science 213 or equivalent. (Offered in alternate years.) [0-0; 2-2]

414. (1½) *Plant Tissue Culture and Micropropagation*.—Application of tissue culture techniques to plant propagation, breeding, long term storage, secondary product synthesis and disease control. (Offered in alternate years). [2-2; 0-0]

415. (1½) *Structure, Form and Adaptability in Planting Design*.—Lectures and exercises dealing with plants as structural elements in landscape. Plant associations. Horticultural adaptations. Planning in relation to subsequent maintenance. Prerequisite: Plant Science 316. [2-2; 0-0]

416. (1½) *Trees and Shrubs in the Landscape II*.—A continuation of the study of the culture and identification of woody landscape plant materials. Prerequisite: Plant Science 316. [0-0; 2-2]

417. (1½) *Vegetable Crops*.—Science and practice of producing vegetable crops emphasis on morphology, growth processes, production, harvesting, quality and composition. [2-2; 0-0]

418. (1½) *Controlled Environment Crop Production*.—Floriculture and vegetable crop production in greenhouses and other controlled environment systems. (Offered in alternate years.) [0-0; 3-2]

423. (1) *Undergraduate Seminar*.

426. (1½) *Post-harvest Physiology*.—Changes in the metabolism and quality of harvested crops; effects of pre- and post-harvest environmental conditions. (Offered in alternate years.) [0-0; 2-2]

430. (1-3)c *Directed Studies*.

431. (1½) *Biological Responses to Weather*.—The biological effects of weather and climate. Examples from studies of insects and from ecological, medical and historical studies illustrate how large-scale weather patterns, acting through the biosphere, may influence man's affairs by affecting pests, crops, and people. [0-0; 2-0-2]

432. (1½) *Insect Physiology*.—Physiology of insect growth and development with emphasis on insects of economic importance; physiological basis of insect control. Prerequisite: Plant Science 331 or Zoology 311. (Offered in alternate years.) [0-0; 2-2]

433. (1½) *Protection of Horticultural Crops*.—An integrated approach to the diagnosis, identification and control of pest, disease and weed problems of horticultural crops. Collections of horticulturally important weeds and horticultural species illustrating pest damage or disease are required. Prerequisites: Plant Science 331, 336, 338. (Offered in alternate years.) [0-0; 3-2]

435. (1½) *Pesticides*.—Chemical properties, physiological effects and usage of insecticides, nematocides, herbicides and fungicides. Pesticides and the environment. Prerequisite: Chemistry 230. (Offered in alternate years). (Same as Pharmaceutical Sciences 435) [0-0; 3-0]

437. (1½) *Physiological Plant Pathology*.—Study of the mechanisms of pathogenesis and the physiological responses induced in diseased plants. (Offered in alternate years.) [0-0; 3-1]

438. (1½) *Herbicide Physiology and Biochemistry*.—Chemical structure, mode and mechanism of action, selectivity and metabolism of herbicides. (Offered in alternate years). [0-0; 3-0]

498. (1½) *Undergraduate Essay*.—Preparation of a comprehensive and analytical review of an approved topic under the supervision of a faculty member. Prerequisite: Approval of the Head of Department. Students should consult a Faculty Advisor before the end of classes in third year.

499. (3) *Undergraduate Thesis*.—Design and execution of an experimental/analytical research project leading to preparation of a thesis. The project must be related to the student's option. Prerequisites: Plant Science 322. Students should consult a Faculty Advisor during the first term of third year. Approval for the project must be obtained from the Head of the Department before its initiation, and in any event not later than October 1.

500. (1-3)c *Special Advanced Courses*.—Seminars or workshops on various topics to be arranged in response to graduate student and faculty interests.

503. (1½) *Rangeland Ecology*.—Detailed study of selected rangeland communities through investigation, analysis and synthesis of available literature.

504. (3) *Principles, Techniques and Problems in Applied Plant Ecology*.—Analysis of grazing and cropping systems; energy conversion and conservation; trophic levels and cycles; techniques and problems in arable land and wildland management.

505. (1½) *Topics in Range Management*.—Seminar series involving case studies on selected topics in rangeland ecology; emphasis on the relationships among classical plant ecology, biological systems and interactions, and managerial techniques.

510. (1½) *Ecological Genetics*.—The genetic basis of ecological relationships. A review of basic population genetics will provide the background for further investigations for reproductive strategies, influences of population structure, predator-prey and plant herbivore interactions, crop genetic variability, and other topics on basic and applied ecological genetics. Lectures and discussions. (Same as Biology 510).

511. (1½) *Advances in the Pomology of Berry Crops*.

512. (1½) *Advances in the Pomology of Tree Fruits*.

513. (1½/3)c *Advances in Plant Breeding*.—Recent advances in plant breeding methodology. Novel methods of gene transfer and the application of *in vitro* technology to breeding problems. Prerequisites: Plant Science 413 and Botany 437 or equivalent. (Offered in alternate years.)

514. (1½) *Advanced Tissue Culture and Micropropagation*.—Research methods and current problems in the *in vitro* culture of plants and plant tissues. (Offered in alternate years.)

516. (1-3)c *Advanced Studies in Landscape Architecture*.—Problems in landscape architecture involving field investigations, emphasizing the changing landscape and man's role in protecting, preserving and upgrading the environment through site design and landscape planning.

517. (1½) *Advanced Topics in Vegetable Crop Production*.—Physical, biochemical, physiological and technical concepts of production of vegetable crops, with emphasis on critical review of current research. (Offered in alternate years.)

521. (1½/3)c *Biometrical Techniques*.—Advanced biometrical techniques in agricultural experimentation. Prerequisite: PLNT 322 or equivalent.

523. (0) *Graduate Research Seminar*.

525. (1½) *Physiological Origins of Crop Yield*.—Crop growth analysis. Relationships among crop density, planting patterns, canopy structure and dry matter productivity. (Offered in alternate years).

526. (1½) *Topics in Crop Physiology*.—Environmental regulation of the processes of assimilation, assimilate partitioning and development which contribute to productivity in major world crops. (Offered in alternate years.)

527. (1½) *Advanced Topics in Post-harvest Physiology*.—Biochemical and biophysical changes associated with maturation, ripening and senescence of harvested crop products. (Offered in alternate years.)

530. (1-3)c *Directed Studies*.

531. (1½) *Biological Control*.—Theory of biological control. Case histories. Concepts of

natural insect population regulation. Development of integrated control programs and environmental manipulations. (Offered in alternate years.)

532. (1½) *Advanced Insect Physiology*.—Recent advances in selected fields of insect physiology, emphasizing the neural and/or hormonal integration of metabolic activities. Prerequisite: Plant Science 432. (Offered in alternate years.)

533. (1½) *Herbicide Biochemistry and Physiology*.—Chemical structure and properties as they relate to the selectivity of herbicides, the mode and mechanism of herbicide action, and the fate of herbicides in plants. (Offered in alternate years).

534. (1½) *Vectors of Plant Pathogens*.—Morphological and physiological specializations enabling insects and other arthropods, nematodes, fungi and higher plants to transmit plant pathogens. Mechanisms of transmission of viruses, mycoplasmas, bacteria, fungi and toxins causing plant diseases. Laboratories will emphasize pathogen transmission. Limited enrolment. (Offered in alternate years.) [0-0; 2-3]

535. (1½) *Topics in Plant Pathology*.—Advances in techniques for pathogen detection, disease assessment and plant disease control. (Offered in alternate years.)

536. (1½) *Plant Virology*.—Identification, Structure, biosynthesis and control of viruses causing plant diseases. Laboratories will emphasize instrumental techniques used in plant virus research. Limited enrolment. (Offered in alternate years.) [2-3; 0-0.]

537. (1½) *Disease Physiology*.—Current research into the biochemical basis of plant pathogen recognition, pathogenesis and disease resistance. (Offered in alternate years). Permission of Instructor.

538. (1½) *Topics in Weed Ecology*.—The response of weed species to agricultural management practices will be considered within the context of ecological characteristics that make a species a weed. (Offered in alternate years). (Same as Botany 538).

539. (1½) *Responses of Plants to Air Pollutants*.—Effects of air pollutants on the biochemistry, growth and yield of plants; involvement of climatological factors; methods of protection. (Offered in alternate years.)

549. (6) *Master's Thesis*.

649. *Ph.D. Thesis*.

Polish (Department of Slavonic Studies, Faculty of Arts)

110. (3) *Basic Polish*.—An introductory course. [3-1; 3-1]

210. (3) *Second-Year Polish*.—Prerequisite: Polish 110. [3-1; 3-1]

445. (1½) *Survey of Polish Literature*.—Major trends and writers from the Sixteenth to the Nineteenth Century. [2-0; 2-0.]

446. (1½) *Studies in Polish Literature*.—The course will focus on major writers of a selected period (e.g., Renaissance, Romanticism, Modern). Prerequisite: two years of Polish. [2-0; 2-0]

545. (1½/3)**d** *Studies in Polish Literature*.

549. (3/6)**c** *Master's Thesis*.

649. *Ph.D. Thesis*.

Political Science (Faculty of Arts)

200. (1½) *The Government of Canada*.—An examination of the institutions and processes of Canadian government. [3-0]

220. (1½) *Foreign Governments*.—A comparative analysis of foreign governments. Specific countries to be covered will vary according to section; students should consult the brochure issued by the Political Science Department. [3-0]

240. (1½) *Introduction to Political Thought*.—An introduction to some of the major political theorists and to the principal ideologies in the modern world. [3-0]

260. (3) *International Politics*. —The analysis of the relations between states includes such topics as the evolution of international systems, East-West and North-South issues, the techniques of wielding international influence (through diplomacy, propaganda, foreign aid, subversion, and war) and the sources and nature of international conflict and cooperation. This course is strongly recommended for students who will later take Political Science 360-366. [3-0; 3-0]

280. (1½) *Introduction to Political Behaviour*.—The study of elections, public opinion and ideology, and political coalitions, using major techniques of empirical analysis (e.g., survey research, experiments, content analysis). [3-0]

301. (1½) *Canadian Political Parties*.—The organization and operation of party politics and the systems of party competition in Canada. The focus is on national-level politics. Prerequisite: Political Science 200.

302. (3) *Public Administration*.—The structure and organization of the administrative branch of government in theory and practice. Administrative powers and policy-making in the modern state. Examples of the administrative processes are drawn from Canada and other countries. [3-0; 3-0]

303. (1½) *Federalism in Canada*.—Theory and practice of federalism; cultural duality, social stresses, and problems of flexibility. The constitution and role of the courts. Prerequisite: Political Science 200. [3-0]

304. (1½) *British Columbia Government and Politics*.—An examination of the party system, and other institutions and processes of the British Columbia political system. Prerequisite: Political Science 200. [3-0]

305. (1½) *Canadian Political Ideas*.—Political theories and ideologies in Canada. Prerequisite: Political Science 200. [3-0]

306. (1½) *Local Government and Politics in Canada*.—Local and regional political institutions and processes in Canada, with particular attention to those of Vancouver and other British Columbia localities. Prerequisite: Political Science 200. [3-0]

307. (1½) *Quebec Government and Politics*.—The nature of politics and the conduct of government in contemporary Quebec. The course is open to students from fields other than political science. Prerequisite: Political Science 200. [3-0]

320. (3) *American Government and Politics*.—The social context of American politics, voting behaviour, legislative process, executive powers, executive-legislative relations, judicial behaviour and problems of policy: labour, commerce, civil rights, etc. [3-0; 3-0]

321. (3) *Chinese Government and Politics*.—The political system of China, approached from a number of perspectives; as a continuing development within the framework of Chinese history and culture; as a case study of political modernization; in the context of world communist movements; as an object of comparison with other political systems. [3-0; 3-0]

322. (3) *Japanese Government and Politics*.—The Japanese political system and political behaviour, with some coverage of neighbouring areas, such as South Korea, Taiwan, with major emphasis on the period since 1945. [3-0; 3-0]

323. (3) *South Asian Government and Politics*.—Comparative analysis of politics and government in India, Pakistan, Bangladesh and Sri Lanka. Imperial legacies and nationalist movements; political institution-building amidst socio-cultural diversity; parties and interest groups; elections and leadership crises; military intervention; ethnic and class conflicts; foreign policy. [3-0; 3-0]

324. (3) *Southeast Asian Government and Politics*.—The political systems of contemporary Southeastern Asia. [3-0]

325. (1½) *Soviet and East European Government and Politics*.—An analysis of the domestic politics of Communist political systems. This course examines the evolution of Soviet politics and compares the Soviet Union with other Communist nations. [3-0; 3-0]

326. (1½) *British Government and Politics*.—Nature of politics and conduct of government in contemporary Britain, including the problem of governmental reform and the making of foreign policy. Development of parliamentary democracy; electoral system and political parties; the executive and its relation to the legislature; the Crown, the Prime Minister, and the Cabinet; Central departments; the Civil Service. [3-0]

327. (1½/3)**d** *African Government and Politics*.—A comparative analysis of state-building and statecraft in sub-Saharan Africa, with focus upon the new African state: its origins in colonialism; the impact of traditional African political systems upon it; its contemporary characteristics; state-society relations and conflicts; international relations of African states; the development and decay of such states. [3-0; 3-0]

328. (1½/3)**d** *Topics in Comparative Politics*.—Topics will vary year to year. Students should consult the brochure issued by the Political Science Department.

340. (3) *History of Political Ideas*.—An introduction to the political ideas of leading political philosophers from Ancient Greece to the 19th century with special reference to Plato, Aristotle, St. Augustine, St. Thomas Aquinas, Machiavelli, Hobbes, Locke, Rousseau, Hegel and J. S. Mill. [3-0; 3-0]

342. (1½) *Modern Political Theory: Analysis of a Selected Theorist*.—A detailed examination of an acknowledged masterpiece of modern political theory. The text and attendant literature vary from year to year. Consult the brochure issued by the Political Science Department. [3-0]

344. (1½) *Social and Political Thought*.—An examination of some of the major concepts in political philosophy such as justice, equality, rights, obligation, liberty in the context of both classical and contemporary political thought. [3-0]

346. (1½) *Democratic Theory*.—An examination of both classical and contemporary theories of democracy. Representative democratic theory, participatory democratic theory and their relationship to 20th century concepts of democracy. [3-0]

360. (3) *Strategic Studies*.—An analysis of the national security doctrines and policies of the major powers and Canada, the policies and politics of alliances, and problems of arms control and disarmament. [3-0; 3-0]

361. (3) *International Violence and Its Control*.—A study of the nature of international violence from guerrilla to nuclear war; a survey of theories of the causes of interstate war; recent research finding on the causes of war and conditions for peace; a comparative analysis of strategies for controlling violence through disarmament and the promotion of alternative means of conflict resolution. Students enrolling in this course should preferably have previously taken a second-year course in a subject in the social sciences. [3-0; 3-0]

362. (1½) *Foreign Policies of the Superpowers*.—The main focus is on Soviet-American relations in the period since World War II. American and Soviet policies toward their allies and toward the Third World will also be compared and contrasted. [3-0]

363. (1½/3)**d** *Canadian Foreign Policy*.—An analysis of Canadian foreign policy on important international issues since the 1960s and of the policy-making process. Issues may include defence commitments, economic relations, activities of international organizations, and relations with the U.S., Europe, the USSR, Asia and the Third World.

364. (3) *International Organization*.—Analysis of the activities and influence of modern international organizations in international security, economic and social issue areas. The course will focus on organizations associated with the United Nations, but other world and regional bodies will be analyzed as well. [3-0; 3-0]

365. (1½/3)**d** *Asian International Relations*.—Analysis of the foreign policies of one or more of the states of East, Southeast and South Asia. It will focus on their relations with other states in the region as well as with major outside powers.

366. (1½) *International Political Economy*.—An analysis of governmental policies and international political bargaining in regard to such issues as international investment, trade, and monetary relations. Economics 100 or 309 are recommended. [3-0]

380. (1½) *Quantitative Methods in Political Science*.—An introduction to quantitative methods as utilized in the study of Political Science. Not for credit in the Faculty of Commerce and Business Administration. [3-0]

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381. (1½) *Topics in Quantitative Analysis.*—Application of quantitative techniques to selected topics in Political Science. Topics vary from year to year. Interested students should consult the brochure issued by the Political Science Department. Prerequisite: Political Science 380. [3-0]

385. (3) *Political Behaviour.*—The study of political attitudes, public opinion, voting and elections; the use of survey research. Prerequisite or co-requisite: Political Science 380. [3-0; 3-0]

390. (6) *Honours Seminar.*—An examination of the dimensions of Political Science and the major debates within the discipline. [4-0; 4-0]

401. (1½/3)**d** *Canadian Provincial and Regional Politics.*—A seminar which examines political parties, processes and institutions in the provincial political systems and regional arrangements between provinces. Prerequisites: Political Science 200 plus one additional course in Canadian politics selected from 301-306.

402. (1½/3)**d** *Politics of the Canadian Constitutions.*—This seminar examines the creation and amendment; of Canadian Constitutions political aspects of the judicial system; political consequences of court decisions. Prerequisite: Political Science 200 plus one additional course in Canadian politics selected from 301-306.

403. (1½/3)**d** *The Political Economy of Canada.*—A seminar devoted to the analysis of the interplay of economic and social factors in the shaping of Canadian politics: the major issues and strains in the functioning of the Canadian polity. Prerequisite: Political Science 200 plus one additional course in Canadian politics selected from 301-306.

404. (1½/3)**d** *Public Policy and Its Administration.*—A Seminar which examines political and administrative aspects of public policy, particularly in Canada. Prerequisite: Political Science 200 plus one additional course in Canadian politics selected from 301-306.

405. (1½/3)**d** *Topics in Canadian Politics.*—A seminar which examines in depth some of the important issues in Canadian politics. Prerequisite: Political Science 200 plus one additional course in Canadian politics selected from 301-306.

420. (1½/3)**d** *Advanced Topics in Comparative Politics: Western.*—A seminar devoted to comparative analysis of politics in the Anglo-American or European democracies. For specific content in a given year, consult the brochure issued by the Political Science Department. Prerequisite: Any two courses in Comparative Politics, (Political Science 220, 320-328).

421. (1½/3)**d** *Advanced Topics in Comparative Politics: Non-Western.*—A seminar devoted to comparative analysis of politics in non-Western states. For specific content in a given year, consult the brochure issued by the Political Science Department. Prerequisite: Any two courses in Comparative Politics, (Political Science 220, 320-328).

422. (1½/3)**d** *Selected Problems in Comparative Politics.*—A seminar devoted to intensive analysis of a contemporary political problem from a comparative perspective, e.g., ethnic politics, class politics, the politics of post-industrial society. For specific content in a given year, consult the brochure issued by the Political Science Department. Prerequisite: Any two courses in Comparative Politics, (Political Science 220, 320-328).

423. (1½/3)**d** *Issues in Comparative Government.*—A seminar devoted to comparative analysis of constitutionalism, authoritarianism, democracy, etc. For specific content in a given year, consult the brochure issued by the Political Science Department. Prerequisite: Any two courses in Comparative Politics, (Political Science 220, 320-328).

424. (3) *Chinese Political Thought and Institutions.*—See Asian Studies 417.

425. (3) *Communist Movements in Eastern Europe since 1900.*—See History 435.

440. (1½/3)**d** *Contemporary Political Theory.*—This seminar examines the political ideas of leading political philosophers of the 20th century. Prerequisite: Any three units in Political Theory (Political Science 240, 340-346).

442. (1½) *Contemporary Political Theorists: Analysis of a Selected Theorist.*—This seminar examines in detail the political ideas of an important political philosopher of the 20th century. The theorist studied varies from year to year. Consult the brochure issued by the Political Science Department. Prerequisite: Any three units in Political Theory (Political Science 240, 340-346). [3-0]

444. (1½) *Social Science and Political Theory.*—This seminar examines the political and social theories of the founders of modern social science. The relevant writings of such theorists as Tocqueville, Comte, Mill, Marx, Toennies, Weber, Durkheim and others are examined. Prerequisite: Any three units in Political Theory (Political Science 240, 340-346). [3-0]

446. (1½/3)**d** *Topics in Political Thought.*—A seminar devoted to the intensive study of a concept, theme or school in the history of political thought or contemporay political philosophy. Topics vary from year to year. Consult the brochure issued by the Political Science Department. Prerequisite: Any three units in Political Theory (Political Science 240, 340-346).

460. (1½/3)**d** *Foreign Policy Analysis.*—A seminar devoted to the analysis of the foreign policies of one or more states, as well as to the study of literature pertaining to foreign policy analysis. For specific content in a given year, consult the brochure issued by the Political Science Department. Prerequisite: Any two courses in International Politics (Political Science 260, 360-366).

461. (1½) *Peace and Conflict Studies.*—A seminar on a selected topic concerning the causes of war and strategies for the promotion of peace. For specific content in a given year, consult the brochure issued by the Political Science Department. Prerequisite: Any two courses in International Politics (Political Science 260, 360-366). [3-0]

462. (1½) *International Relations Theory.*—This seminar examines some of the major theoretical approaches to the study of international relations. For specific content in a given year, consult the brochure issued by the Political Science Department. Prerequisite: Any two courses in International Politics (Political Science 260, 360-366). [3-0]

463. (1½) *International Interdependence.*—This seminar analyzes issues relating to the politics of international economic relations. For specific content in a given year, consult the brochure issued by the Political Science Department. Prerequisite: Any two courses in International Politics (Political Science 260, 360-366). Economics 100 or 309 are recommended. [3-0]

464. (1½/3)**d** *Problems in International Relations.*—Content varies from year to year and is described in the brochures issued by the Political Science Department and the program in International Relations. One section (of 1½ units) is reserved for fourth-year students in the Major program in International Relations. Prerequisite: Any two courses in International Politics (Political Science 260, 360-366).

465. (1½) *Public International Law.*—The nature, sources, and sanctions of international law; the notion of nationhood with particular reference to the status of the British Dominions; territorial and extra-territorial jurisdiction; diplomatic and sovereign immunities; international delinquency; treaties; settlement of disputes; international organizations. This course is offerd by the Faculty of Law. It may not be taken for credit in both Arts and Law. [3-0]

490. (3) *Honours Seminar.*—Research seminar in specific areas in Political Science related to the students' interest and current faculty research. [3-0; 3-0]

491. (3) *Honours Essay.*

501. (1½) Canadian Government and Politics.

502. (1½) *Canadian Political Institutions and Processes.*

503. (1½) *Canadian Political Parties and Participation.*

504. (1½) *Topics in Canadian Politics.*

511. (1½) *Comparative Government and Politics.*

512. (1½) *Theories in Comparative Politics: Political Development.*

513. (1½) *Theories in Comparative Politics: Cleavages and Integration.*

514. (1½) *Comparative Western Government.*

515. (1½) *Comparative Non-Western Governments.*

516. (1½) *Issues in Comparative Politics.*

521. (1½) *Political Theory.*

522. (1½) *Topics in Political Theory.*

523. (1½) *Political Thought.*

531. (1½) *Public Administration.*

532. (1½) *Topics in Public Administration.*

533. (1½) *Topics in Public Policy.*

540. (3) *Master's Seminar.*

549. (3/6)**c** *Master's Thesis.*

551. (1½) *Political Behaviour.*

552. (1½) *Research Seminar in Political Behaviour.*

553. (1½) *Topics in Empirical Theory.*

561. (1½) *International Relations.*

562. (1½) *Topics in International Relations.*

563. (1½) *International Organization.*

564. (1½) *Research Seminar in International Relations.*

565. (1½) *International Law Problems.*—(see Law 425) Prerequisite Pol. Sc. 411 or permission of Instructor.

571. (1½) *Methods of Political Analysis.*

572. (1½) *Quantitative Techniques of Political Analysis.*

580. (1½/3)**c** *Directed Studies.*

649. *Ph.D. Thesis.*

Portuguese (Department of Hispanic and Italian Studies, Faculty of Arts)—See Spanish and Portuguese.

Preventive and Community Dentistry (See course listings under Dentistry)

Probability and Statistics

Listed below are the introductory courses in probability and statistics. Students may obtain credit for only one course in any column and may obtain at most a total of 3 units from all of these introductory courses. Therefore, a student obtaining credit for a 3 unit course in column three could not obtain additional credit for courses in the first two columns.

Probability	Statistics	Probability and Statistics
COMM 211 (1½)	ANTH 318 (1½)	COMM 318 (3)
MATH 205 (1½)	BIOL 300 (1½)	COMM 311 (3)
STAT 205 (1½)	COMM 212 (1½)	FRST 130 (3)
STAT 251 (1½)	COMM 418 (1½)	MECH 558 (3)
	EDUC 482 (1½)	POLI 309 (3)
	EDUC 483 (1½)	PSYC 316 (3)
	GEOG 374 (1½)	PSYC 366 (3)
	NURS 320 (1½)	STAT 251 (1½)
	PHED 371 (1½)	
	PLNT 321 (1½)	
	SOCI 318 (1½)	
	STAT 105 (1½)	
	STAT 203 (1½)	

Students may obtain credit for at most one of the following courses: FRST 430, PLNT 322, BIOL 301.

The following list of courses in Probability and Statistics, while not complete in the sense that there are many other courses which deal with the uses of statistics in particular fields of study, contains most of the courses in which principles and techniques of Probability and Statistics are discussed.

Anthropology
318. *Statistical Methods I.* (Same as Statistics 203)
418. *Social Statistics.* (Same as Sociology 418)
527. *Advanced Archeological Methods.*
527. *Advanced Quantitative Methods.*

Biology
300. *Biometrics.*
301. *Biomathematics.*
509. *Advanced Biometrics.*

Commerce
211. *Business Applications of Probability.*
212. *Business Applications of Statistics.*
311. *Decision Analysis.*
318. *Quantitative Methods I.*
418. *Quantitative Methods II.*
581. *Statistical Methodology, I.*
582. *Statistical Methodology, II.*
583. *Forecasting and The Time Series Analysis in Business Environments.*
584. *Topics in Advanced Business Statistics.*
585. *Applied Stochastic Processes.*
586. *Dynamic Programming and Stochastic Control.*
587. *Seminar in Stochastic Models.*

Economics
325. *Introduction to Empirical Economics.*
326. *Methods of Empirical Research in Economics.*
429. *Introduction to Econometrics.*
526. *Probability and Statistics for Use in Economics.*
527. *Econometric Methods of Economic Research.*
529. *Advanced Econometrics.*

Education Psychology
482. *Introduction to Statistics for Research in Education.*
483. *Statistics in Education.*
484. *Nonparametric and Related Statistics.*
592. *Design and Analysis in Educational Research I.*
596. *Design and Analysis in Educational Research II.*
597. *Factor Analysis and its Application to Behavioural Sciences.*
682. *Multivariate Analysis in Behavioural Research.*

Forestry
130. *Biometrics and Data Processing.*
430. *Advanced Biometrics.*
431. *Sampling Methods.*
530. *Multiple Regression Methods.*
531. *Multivariate Statistical Methods.*
533. *Problems in Statistical Methods.*
539. *Problems in Forest Sampling.*

Geography
374. *Statistics in Geography I.*

Health Care and Epidemiology
400. *Statistics in the Health Sciences.*

Mathematics
205. *Probability and Statistics I.* (Same as Statistics 205)
302. *Introduction to Probability.* (Same as Statistics 302)
303. *Introduction to Stochastic Processes.*
418. *Introduction to Probability Theory.*
518. *Probability.*
537. *Topics in Probability.*

Mechanical Engineering
558. *Engineering Applications of Statistical Distribution Theory.*

Nursing
320. *Introduction to Statistics and Research Methodology.*

Pharmacology
404. *Drug Assay and Pharmacometrics.*

Physical Education
371. *Tests and Measurements in Physical Education.*

Physics
509. *Theory of Measurements.*

Plant Science
321. *Biometrics.*
322. *Design of Experiments.*

Political Science
380. *Quantitative Methods in Political Science.*
381. *Topics in Quantitative Analysis.*

Psychology
316. *Methods in Research.*
366. *Methods in Research.*
545. *Advanced Statistics I.*

Rehabilitation Medicine
402. *Introduction to Scientific Inquiry*

Sociology
318. *Statistical Methods I.* (Same as Statistics 203)
418. *Social Statistics.* (Same as Anthropology 418)

Statistics (See courses offered by the Department of Statistics).

Wood Science and Industry
335. *Principles of Industrial Quality Control.*

Psychiatry (Faculty of Medicine)

425. *Introduction to Psychiatry.*—Lectures and supervised clinical experience. (a) Psychopathology and signs and symptoms in psychiatry; (b) psychiatric examination of the patient, including taking of the personal and family history and the mental status examination; (c) interview procedures and processes and interviewing under supervision; (d) history of psychiatry. Textbooks: Mayer-Gross, Slater and Roth, Clinical Psychiatry; Redlich and Freedman, The Theory and Practice of Psychiatry; Gregory, Fundamentals of Psychiatry. Reference text: Friedman and Kaplan, Comprehensive Textbook of Psychiatry. In addition, reading lists are provided for courses and areas of study.

450. *Principles of Psychiatry and Clerkship in Psychiatry.*—Based upon material covered in the first year and second year, the student is expected to learn various aspects of the diagnostic process in psychiatry through lectures and supervised clinical experience. (a) Systematic review of psychiatric syndromes and reaction-types; (b) introduction to concepts of etiology including psychodynamics; (c) introduction to certain aspects of treatment. Textbooks: Besides textbooks already listed under Psychiatry 425, students should have Diagnostic and Statistical Manual Mental Disorders (Third Edition—D.S.M. III), prepared by the Committee on Nomenclature and Statistics of the American Psychiatric Association; Foundations of Clinical Psychiatry, Joseph M. Strayhorn, Jr.

451. (1½) *Neurochemistry.*—The main objective of this course on neurochemistry is to describe biochemical phenomena that subserve activity of the nervous system or are associated with neurological diseases. Lectures designed primarily for third year medical students as a basic science elective course. Departmental approval.

452. (1½) *Seminars in Behavioural Sciences.*—Weekly seminars dealing with behavioural science topics related to medical practice. Third year elective for Medical students.

475. *Psychiatry.*—Emphasis is upon bringing together material learned in previous years on psychopathology, etiology and psychodynamics, and therapy in the development of a diagnostic formulation and a treatment plan. Under supervision, clinical clerks treat selected adult in-patients on an in-patient service; they also participate in the maintenance of the therapeutic milieu of the ward. On an out-patient basis they evaluate and treat a family in which there is a child or an adolescent who is identified as a psychiatric patient. Seminars are concerned with further material on etiology and therapy, and with special topics in psychiatry—addiction, forensic psychiatry, child psychiatry, community psychiatry, aging, mental deficiency, etc. Textbooks: see list given under Psychiatry 425 and reading lists provided.

500. (1) *The History of Psychiatry.*—A series of lectures and seminars given on alternate years in the second half of the year and concerned with an historical review of psychiatry from earliest times to the present.

501. (1) *Psychopathology.*—A series of lectures and seminars concerned with a presentation for first-year graduate students of signs, symptoms and syndromes in psychiatry. Texts and readings are assigned.

502. (1) *The Interview and the Examination of the Patient.*—Lectures and demonstrations for first year graduate students concerned with the concepts, processes and clinical skills required in interviewing for both diagnosis and treatment. Texts and readings are assigned.

503. (1) *Psychotherapy I.*—This introductory course is conceptualized as a direct continuation of Psychiatry 502 (1) *The Interview and the Examination of the Patient.* This is an introductory course which will focus on the study of principles and practice of interpersonal and social management of general psychiatric patients in in-patient and ambulatory clinical settings. Didactic seminars with demonstrations and practicum, with audio-visual documentary recordings for self-study. Assigned literature. Prerequisites: Permission of the Department, PSYT 501, 502.

504. (1) *Drugs and Somatic Treatments in Psychiatry.*—Lectures and demonstrations concerned with a presentation of the rationale and use of drugs and somatic treatments. Texts and readings are assigned. Psychiatry 501 and 502 are prerequisites.

505. (1) *Methods in Evaluation and Research.*—A course of seminars and demonstrations dealing with methods and techniques for the evaluation of programs and treatment in

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Psychiatry, with research design and research procedures, including such problems as the use of controls in psychiatric research, the use and interpretation of statistics, etc. Texts and readings to be assigned.

506. (1) *The Province and Functions of Psychiatry.*—A course of lectures and seminars dealing with roles, responsibilities and functions assumed by and assigned to psychiatry in medicine and in the community. The course deals with the patterns by which care has been made available in the past, with contemporary patterns now emerging, with the assumptions underlying these developments, and with the problems and issues that appear to be of relevance to psychiatry in the future. Given in alternate years.

507. (2) *Psychotherapy II.*—Course of lectures, seminars and demonstrations concerned with the processes, techniques and concepts of individual psychotherapy. Includes initial assessment, ongoing evaluation of progress and assessment of outcome of patients undergoing reintegrative or reconstructive psychotherapy. A preliminary review of major schools and approaches to psychotherapy is given. Texts and readings are assigned. Prerequisites: PSYT 501, 502, 503.

508. (1) *Group, Milieu, Family, Marital Psychotherapies I.*—This is an introductory course primarily for first year psychiatric residents, to outline theoretical framework of small social group in which the interpersonal processes can be conceptualized; to achieve an understanding of the function of the individual in the context of natural groups; to develop basic skills in observing patients' groups, paying balanced attention to individual members and the group as a whole; to demonstrate a variety of verbal and non-verbal techniques used in group, family and milieu therapy; residents' experiential group.

509. (1) *Theories and Etiology.*—This course deals with the dynamics of human behaviour and the etiology of mental illness in a comprehensive manner at three levels of organization—molecular and cellular, psychological and social given in second and third years.

510. (2) *The Neurological Basis of Human Behaviour.*—Concerned with the structure, development and function of the human nervous system and the relationship of these to normal and abnormal human behaviour, thinking and emotions. Given through the second year. Psychiatry 501 and 504 are prerequisites. Texts and readings are assigned.

511. (1) *The Neurological Basis of Human Behaviour (Laboratory).*—Dissections and demonstrations of the structure and functions of the human nervous system. Prerequisite: Psychiatry 510.

512. (1) *Problems of Cerebral Function.*—A dissertation in a field related to the content of Psychiatry 510. Prerequisite: Psychiatry 510.

513. (1) *Behaviour Physiology.*—An advanced course of lectures and seminars provided on an elective basis in the second half of the year and concerned with a survey of experimental work on the process of the nervous system underlying normal and abnormal behaviour in humans and primates; with special emphasis on the physiological correlates of higher nervous activity. Prerequisite: Psychiatry 501. Texts and readings to be assigned.

514. (1) *Neurochemistry.*—An advanced course provided on an elective basis elaborating chemical principles underlying mental functions. Current findings and theories on chemical aspects of mental illness and certain neurological disorders are presented and discussed. Prerequisite: Psychiatry 501.

515. (1) *Psychopharmacology.*—An advanced elective course presenting current facts and theories relating the use of various drugs, experimental and therapeutic, to basic chemical and enzymatic processes in brain and nervous tissue, with special reference to mental illness and research in psychiatry. Prerequisite: Psychiatry 501. Texts and readings to be assigned.

518. (1) *Group, Milieu, Family, Marital Psychotherapies II.*—A course of lectures and demonstrations concerned with the theories of group functioning (psychodynamic, learning theories, social exchange, attribution theories) and working models of group and milieu therapy, (various psychodynamic models, psychodrama and sociometry, transactional analysis, behavioral approaches, T-group, etc.); working models for family and marital therapy; and indications for these modalities will be studied. The student functions as co-therapist in group, family, marital and milieu therapy. Prerequisite: PSYT 508.

520. (2) **Social Psychiatry.*—A course of lectures and seminars dealing with the relationships between mental illness and a range of social and ecological variables, and with current epidemiological knowledge about the frequency and distribution of mental illness. Texts and readings are assigned.

*Offered to second and third year graduates.

523. (2) *Psychotherapy III.*—An advanced course concerned with the processes, techniques as well as theories of individual psychotherapy. Concepts of major psychotherapy schools and their relationships to personality theories are critically reviewed and compared. Brief intensive psychotherapies, behavioral psychotherapy, hypnotherapy, crisis intervention, etc., are studied. Principles of psychotherapeutic management and ongoing evaluation of cases appropriate to these various modalities of psychotherapy are demonstrated and practiced. Readings will be assigned. Prerequisites: PSYT 507.

524. (2) *Psychotherapy IV.*—An advanced course of lectures, seminars, demonstrations and practice, concerned with theoretical issues and practical approaches to the management of difficult individual cases, e.g., personality disorders, psychotic states in remission, etc. The spectrum of therapeutic problems chosen for study will seek to integrate concepts of treatment of individuals of all ages, from the very young to the geriatric case. Texts and readings will be assigned. Prerequsities: PSYT 503, 507, 523.

528. (1) *Group, Milieu, Family, Marital Psychotherapies III.*—Advanced course of lectures, seminars and demonstrations in group, family and milieu therapies; with major emphasis on marital and family therapies. Differing orientations (e.g., focus on individuals or on a group; focus on here-and-now, as opposed to the historical approach), and controversial issues will be presented. Each resident will conduct group, marital and family therapy under supervision. Texts and readings will be assigned. Prerequisite: PSYT 518.

530. (2) *Development and Learning.*—This course deals with individual development as related to personality growth, mental health, and mental illness. This is a required course for the second year. Texts and readings are assigned.

531. (1) *Child Psychiatry.*—This course deals with diagnosis, prevention and treatment of mental illness and mental retardation in children. Psychiatry 530 is a prerequisite.

538. (1) *Group, Milieu, Family, Marital Psychotherapies IV.*—Advanced course of lectures, seminars and demonstrations of special problems (different diagnostic groups, groups with specific goals, e.g. weight control, assertiveness, communication skill learning). Problems of indication, composition of groups, termination, etc. will be studied. Each resident will conduct group, family and marital therapy under supervision. Role of psychiatrist as a consultant to paramedical professionals in group, family and milieu therapy will be studied. Prerequisite: PSYT 528. Study materials will be assigned.

540. (1) *Psychological Measurement.*—This deals with the rationale and administration of various psychological tests and measurements in the clinical setting, and with personality and other theories underlying their use. The course has been developed for both psychiatrists and clinical psychologists in training. Given in the first year. Readings and texts are assigned.

550. (3) *Directed Studies.*—This provides for a program of directed reading and study in such special areas as may be relevant to the student engaged in some particular field of study and research in Psychiatry.

560. (6) *Master's Thesis.*

650. *Postdoctoral Internship in Clinical Psychology.*—A one-year program for clinical psychologists who wish to develop specified skills in mental health intervention. Supervised training at the Health Sciences Centre Hospital by Department of Psychiatry faculty includes: the behavioural approaches to marital discord, anxiety disorders, reactive depression, sexual dysfunction and habit disorders; the development of psychological assessment, consultation and treatment evaluation skills; the development of acute patient (i.e. inpatient) management skills; and the development of community team and interdisciplinary interaction skills. Prerequisites include a doctoral degree in clinical psychology.

700. *Problem Patient Conference.*—All residents on service attend. The resident outlines the particular problem presented, interviews the patient behind a one-way screen, and this is followed by a discussion with the clinical supervisor and the other residents. Two hours weekly.

701. *Ward Rounds.*—Attended by clinical supervisor, all residents and representatives of other members of the treatment team. Patients are presented, discussed, and diagnosis and treatment formulated.

702. *Out-patient Supervision.*—The clinical supervisor meets with each resident individually for one hour per week to discuss out-patients.

703. *Ward Management Meeting.*—A meeting held once a week, attended by all staff (including the clinical supervisor), which focuses on staff conflicts which impair effective work relationships.

704. *Individual Case Supervision.*—This is provided to two residents per week on an individual and rotating basis, and provides in-depth supervision of selected in-patients.

705. *Tutorial.*—Each student in the postgraduate program is assigned a tutor. These weekly two-hour sessions are devoted to discussion and study of long-term psychotherapy cases.

706. *Departmental Conference.*—All residents are expected to attend these conferences. Presentations are made by faculty, residents, and visiting speakers. One and one half hours weekly.

707. *Group Therapy.*—Each resident is expected to carry, or participate in group therapy sessions. Supervision is available for this activity. Two hours weekly.

717. *Human Sexuality.*—Clinical experience in the University sex therapy unit in the Department of Psychiatry. Instruction in interviewing, assessment, and treatment of individuals and couples with problems in sexual function. Part-time rotation two days per week for a three-month period.

720. *Child Psychiatry Conference.*—Every two weeks, 1½ hours are spent by residents in Child Psychiatry, under the supervision of a member of the Division of Child Psychiatry, either in the one-way screen evaluation and subsequent discussion of a family or in the seminar presentation of a topic in the field of child psychiatry.

721. *Adolescent Services.*—Every two weeks, 1½ hours are spent in a case conference and 1½ hours per month in a literature seminar. Residents also spend 2-5 hours weekly, treating adolescents and their families. Residents are exposed to, and follow patients through, a spectrum of care; community, out-patient, day treatment and residential treatment. Reading assigned.

722. *Community Consultation.*—Residents have a supervised placement with a community agency (e.g. school, child welfare agency, juvenile court) to learn how to be a mental health consultant, optimizing the skills of primary professionals in contact with disturbed children (1½ hours per week). Reading assigned.

723. *Services for Handicapped Children.*—Residents are exposed to the spectrum of care available for handicapped children, working with and supervised by a faculty member. Residents also treat a family or families in which there is a handicapped child. (Three hours per week).

724. *Clinical Work and Supervision.*—Two hours are spent each week in the supervision of the clinical work of residents in Child Psychiatry by a member(s) of the Division of Child Psychiatry. During this time, the evaluation and treatment of cases are discussed in detail, generalizations are made about the clinical syndromes presented, and the relevant literature is introduced for discussion. At least ten hours of clinical work per week form the basis of this supervised work.

725. *Multidisciplinary Assessment of Seriously Disturbed Children.*—Each week, 2-3 hours are spent in multidisciplinary case conferences concerning children admitted to E1A (an assessment unit for disturbed children at the Health Centre for Children at the Vancouver General Hospital). Further involvement may include following a family through intake and assessment (three hours per week), involvement with groups (two hours per week), or more intensive involvement (10-20 hours per week). Reading assigned.

726. *Family Therapy.*—In addition to regular ongoing supervision of family therapy, there is a seminar series (two hours weekly) devoted to family theory and practice. Reading assigned.

Psychology (Faculty of Arts)

Note: Students registered in the B.Sc. Psychology program must elect Faculty of Arts courses other than Psychology to satisfy the Faculty of Science requirement of nine units of Arts. Credit will not be given for both Psychology 200 and 260, 316 and 366 or 304 and 360. In addition to Psychology 348 and 448, all Psychology courses numbered 60 or higher in the last two digits have Science credit but they cannot be used to satisfy the science requirements of the Faculty of Arts.

100. (3) *Introductory Psychology*.—Emphasis on current research and the psychologist's approach to problems in the context of representative theories and issues in psychology. Specific topics of study selected by individual instructors vary considerably from section to section. [3-0; 3-0]

200. (3) *Experimental Psychology*.—A detailed introduction to experimental and theoretical aspects of sensation, perception, learning and motivation. The emphasis is upon content rather than method but with some attention to elementary statistics. [3-0; 3-0]

206. (3) *Dynamics of Behaviour*.—An experimental, dynamic and social approach to behavioural adjustment with special reference to applications. [3-0; 3-0]

260. (3) *Experimental Psychology and Laboratory*.—A detailed introduction to experimental and theoretical aspects of sensation, perception, learning and motivation. The lecture emphasis is upon content with some attention to simple problems of statistics and experimental design. The laboratory consists of familiarizing the student with the experimental procedures involved in acquisition and analysis of data in these subject areas. Prerequisites: Completion of first year Science program or equivalent and permission of the Head of Department. [3-2; 3-2]

300. (3) *Behaviour Disorders*.—The definition, history and scope of deviant behaviour, with emphasis on the psychological factors that control its origins, maintenance and modification. Prerequisite: Psychology 100 or 200 or 206 or 260 or permission of instructor. [3-0; 3-0]

301. (3) *Developmental Psychology*.—The psychological development of infants and children from birth to adolescence. Emphasis on intellectual and social development and the development of personality. Prerequisite: Psychology 100 or 200 or 206 or 260 or permission of instructor. [3-0; 3-0]

303. (1½) *Tests and Measurements I*.—Theory and practice of mental measurement, including units on test reliability and validity, uses, administration, scoring, and interpretation of tests. Prerequisite: At least one of Psychology 100, 200, 206, 260 and at least third-year standing. [3-0; 3-0]

304. (3) *Brain and Behaviour*.—A course on the physiological basis of behaviour for non-psychology majors or for psychology majors who are not in the B.Sc. program. The focus of the course will be on what is known about brain processes involved in perception, motivation, aggression, emotions, psychopathology and learning. Prerequisite: Psychology 200 or 206 or 260 or permission of instructor. [3-0; 3-0]

305. (3) *Theory of Personality*.—Approaches to the theory of personality, principal theoretical problems, research theories of personality as represented by psychological systems. Prerequisite: Psychology 100 or 200 or 206 or 260 or permission of instructor. [3-0; 3-0]

306. (3) *Principles of Animal Behaviour*.—An examination of animal behaviour, from the perspective of evolutionary theory. Among the topics covered are: an introduction to the theory of evolution and behavioural genetics; social systems as ecological adaptations; mating and parental strategies; learning, instincts, and evolution; and the evolution of human behaviour. Credit will not be given for both Zoology 323 and Psychology 306. Prerequisite: Psychology 200 or 260. [3-0; 3-0]

307. (3) *Motivation and Emotion*.—An experimental analysis of motivational processes such as hunger, thirst, exploratory and curiosity behaviour, maternal and reproductive behaviour, fixed action patterns and complex processes involved in social motivation. Prerequisite: Psychology 200 or 260 or permission of instructor. [3-0; 3-0]

308. (3) *Social Psychology*.—Theory and research of individual social behaviour; social motivation; attitudes; group interaction; socialization; racial prejudice; and related topics. Prerequisite: Psychology 100 or 200 or 206 or 260 or permission of instructor. [3-0; 3-0]

309. (3) *Cognitive Processes*.—The contribution of cognitive processes to perception, attention, and memory. An examination of cognitive development, language, thinking and creativity. Prerequisite: Psychology 200 or 260 or permission of instructor. [3-0; 3-0]

310. (3) *Learning*.—A critical survey of the basic experimental findings and theory of the learning process, with emphasis on the theoretical formulation of the necessary conditions for learning, retention and transfer of training. Prerequisite: Psychology 200 or 260 or permission of instructor. [3-0; 3-0]

311. (3) *Individual Differences*.—The nature and patterning of individual psychological characteristics, such as abilities and intelligence, attitudes, interests and personality; their assessment and measurement by means of various psychometric instruments. Prerequisite: Psychology 200 or 260 or permission of instructor. [3-0; 3-0]

312. (3) *History of Psychology*.—A survey of the principal trends of psychological explanation and events in the history of psychology from the earliest times to the present. Prerequisite: Psychology Major or Honours student or permission of instructor. [3-0; 3-0]

313. (3) *Sensation and Perception*.—Historical origins of interest in sensation; sensory systems and perceptual processes; psychophysics and neurophysiological approaches. Prerequisite: Psychology 200 or 260 or permission of instructor. [3-0; 3-0]

316. (3) *Methods in Research*.—A detailed coverage of basic research methods. The design of experiments and statistical analysis. Methods will be applied in laboratory and project work. Prerequisite: Psychology 200. [3-2; 3-2]

320. (3) *Psychology of Sex Differences*.—An examination of physical, psychological, and cultural influences. Prerequisite: Psychology 100 or 200 or 206 or 260 or permission of instructor. [3-0; 3-0]

321. (3) *Environmental Psychology*.—Psychological theory and research on the interaction between organisms and the physical environment with emphasis on applications to the design and management of the man-made and natural environments. Prerequisite: Psychology 100 or 200 or 206 or 260 or permission of instructor. [3-0; 3-0]

322. (3) *Psychology of Aging*.—Developmental issues involved in the transition from young adulthood to old age. Current theories of adult development and aging; the role of genetic and environmental factors in aging; the effects of aging on sensation and perception, learning and cognition, personality and adjustment, intergenerational relations. Prerequisites: 100 or 200 or 206 or 260 or permission of the instructor. [3-0; 3-0]

323. (1½) *Tests and Measurements II*.—A survey of tests for assessing intelligence, abilities, personality, motivation, and interests. Prerequisite: Psychology 303. [3-0]

340. (1-3)c *Directed Studies in Psychology*.—Directed investigation of a problem, requiring a written report of the findings. Prerequisite: satisfactory standing and permission of a faculty member who is prepared to supervise the investigation.

348. (1-3)c *Directed Studies in Biopsychology*.—Directed investigation of an experimental problem requiring a written report of the findings. Prerequisite: satisfactory standing in Psychology 260 and permission of a faculty member who is prepared to supervise the investigation.

360. (3) *Physiological Psychology*.—The relationship between the nervous system and behaviour. The physiological basis of perception, motivation, learning and memory. Prerequisite: Psychology 260 or permission of Head of Department. [3-0; 3-0]

366. (3) *Methods in Research*.—A detailed coverage of basic research methods. The design of experiments and statistical analysis. Methods will be applied in laboratory and project work. Prerequisite: Psychology 260. [3-2; 3-2]

401. (3) *Clinical Psychology*.—A critical review of the theoretical and research foundations of the processes of assessment and behaviour modification in clinical psychology. Prerequisite: Psychology 300 or permission of instructor. [3-0; 3-0]

402. (3) *Experimental Techniques in Personality Research*.—Discussion and laboratory study of the methods used in personality research. Prerequisite: Psychology 316 or 366; and either Psychology 305 or permission of the instructor. [2-2; 2-2]

405. (3) *Social Learning*.—Classical and instrumental conditioning, cognitive learning, and learning by identification in the development of human behaviour. Prerequisite: Psychology 200 or 260 or permission of instructor. [3-0; 3-0]

408. (3) *Social Psychological Research*.—A detailed examination of representative theoretical and empirical studies on such topics as attitudes, conformity, social motivation and interpersonal relations. Practice in the formulation of significant questions and the design and execution of relevant research. Prerequisite: Psychology 308 and either 316 or 366 or permission of instructor. [3-2; 3-2]

409. (3) *Research Methods in Cognitive Processes*.—Problem-solving, concept-formation, thinking, reasoning and their relationships to other functional processes. Prerequisite: Psychology 309 and either Psychology 316 or 366 or permission of instructor. [2-3; 2-3]

414. (3) *Research Methods in Child Psychology*.—Review of principal research methods and designs in developmental psychology. Supervised research experiences on child behaviour in controlled laboratory situations and naturalistic settings. Prerequisite: Psychology 301 and either Psychology 316 or 366 or permission of instructor. [3-3; 3-3]

415. (3) *The Psychology of Work*.—An examination of the substantial body of research material and theory concerning human beings at work. Prerequisite: Psychology 200 or 260 or permission of instructor. [3-0; 3-0]

417. (1½/3)d *Special Topics in Psychology*.—An intensive examination of selected topics and issues in psychology. Prerequisite: Psychology 316 or 366 or permission of instructor. [3-0] or [3-0; 3-0]

420. (3) *Community Psychology*.—An examination of the issues and problems involved in the practice of psychology at the community level. Focus of the course will be on the contribution of psychology to the assessment and change of community systems. Prerequisite: Psychology 300 or permission of instructor. [3-0; 3-0]

440. (1-3)c *Directed Studies in Psychology*.—Directed investigation of a problem, requiring a written report of the findings. Prerequisite: satisfactory standing and permission of a faculty member who is prepared to supervise the investigation.

448. (1-3)c *Directed Studies in Biopsychology*.—Directed investigation of an experimental problem requiring a written report of the findings. Prerequisite: satisfactory standing in Psychology 360 and permission of a faculty member who is prepared to supervise the investigation.

449. (3) *Honours Seminar and Essay*.—Students will design and execute a research project and report the development of this project through a series of seminar reports. Students will also discuss research reports by Departmental staff, with emphasis on choice of problems, research design and data analysis.

460. (3) *Hormones and Behaviour*.—A detailed examination of relations between hormones and behaviour. Emphasis on the role of prepubertal and postpubertal hormones in sexual behaviour, aggression, learning, motor activity, and cognition; behaviour disorders and endocrine function; behavioural cyclicity; drug effects on hormone-regulated behaviour, and relations between hormones and neurotransmitters. Prerequisite: Psychology 304, 360 or permission of Head of Department. Permission will normally be granted to students in third or fourth year life sciences programs. [3-0; 3-0]

463. (3) *Research in Sensation and Perception*.—Laboratory course with emphasis on the visual system. Lectures emphasize physical properties of stimuli and subjective experiences (e.g. colour) of same. Field trips may be offered. Prerequisite: Psychology 313 or 360; Psychology 316 or 366; or permission of the Head of the Department. [2-3; 2-3]

465. (3) *Computers in Psychology*.—Laboratory course on the applications of computers in psychological research and theory. Topics covered include: data analysis, computer-aided instruction, computer control of experiments, simulation of psychological theories, clinical diagnosis, testing, and therapy, and computers and thought. Students will learn to

program a computer in a high level language. Prerequisite: Psychology 316 or 366 or permission of the Head of the Department. [2-2; 2-2]

466. (3) *Research Methods in Animal Learning and Cognition.*—An examination, primarily through laboratory work, of learning, cognitive maps, memory, communication, and similar topics. Students will design and carry out individual research projects. Prerequisites: Psychology 316 or 366 and at least one of the following: Psychology 304, 306, 309, 310, 360, or Zoology 323; or permission from the Head of the Department [2-3; 1-4]

467. (1½/3)**d** *Physiological Psychology Laboratory.*—Laboratory methods for studying the relation between brain and behaviour. Prerequisite: Psychology 304 or 360 and Psychology 316 or 366 or permission of Head of Department. [0-6] or [0-6; 0-6]

500. (3) *History of Psychology.*

501. (1½/3)**d** *Proseminar in Personality and Social Psychology.*

505. (3) *Psychometrics.*

510. (3) *Verbal Learning.*

512. (3) *Advanced Methods in Research.*

513. (1½) *Special Topics in Developmental Psychology.*

516. (3) *Topics in Biopsychology.*

519. (1½/3)**d** *Mathematical Psychology.*

520. (1½) *Operant Conditioning.*

521. (3) *Psycholinguistics.*

522. (1½) *Comparative Psychology of Behavioural Adaptations.*

524. (1½/3)**d** *Current Research in Biopsychology.*

525. (1½) *Attitudes and Social Cognition.*—To be offered in alternate years only.

526. (1½) *Individuals and Groups.*—To be offered in alternate years only.

527. (1½) *Interpersonal Processes.*—To be offered in alternate years only.

528. (1½) *Advanced Methods in Social Psychology and Personality.*—To be offered in alternate years only.

529. (1½) *Special Topics in Social Psychology.*—Not offered each year; consult Department of Psychology.

530. (1½) *Assessment through Interviewing Techniques.*

531. (1½) *Behavioural Assessment.*

532. (1½) *Child Assessment.*

533. (1) *Current Issues in Clinical Psychology.*

534. (1-6)**c** *Clinical Psychology Practicum.*

535. (1½) *Psychopathology of the Adult.*

536. (1½) *Psychopathology of the Child.*

540. (1½/3)**d** *Strategies of Psychological Intervention.*

542. (1½) *Behaviour Modification.*

543. (1½) *Special Topics in Theory.*

544. (3) *Patterns of Child-Rearing.*

545. (1½/3)**c** *Advanced Statistics I.*

546. (1/3)**d** *Seminar in Psychological Problems.*

547. (1-3)**c** *Reading and Conference.*

548. (1) *Departmental Seminar.*

549. (3-6)**c** *Master's Thesis.*

556. (1½) *Learning I.*

557. (1½) *Learning II.*

560. (1) *Current Issues in Community Psychology.*

562. (1½) *Special Topics in Community Psychology.*

563. (1½) *Program Evaluation.*

566. (1½) *Theories of Personality.*— To be offered in alternate years only.

567. (1½) *Personality Dimensions and Structure.*—To be offered in alternate years only.

568. (1½) *Personality Assessment.*—To be offered in alternate years only.

569. (1½) *Contemporary Conceptual Issues in Personality.*—To be offered in alternate years only.

570. (1½) *Environmental Psychology I.*

571. (1½) *Environmental Psychology II.*

572. (3) *Field Research in Environmental Psychology.*

574. (1½) *Biopsychology I.*

575. (1½) *Biopsychology II.*

578. (1½) *Perceptual Processes I.*

579. (1½) *Perceptual Processes II.*

582. (1½) *Cognitive Processes I.*

583. (1½) *Cognitive Processes II.*

586. (1½) *Developmental Psychology I.*

587. (1½) *Developmental Psychology II.*

590. (1½) *Survey of Social Psychology I.*

591. (1½) *Survey of Social Psychology II.*

649. *Ph.D. Thesis.*

Radiology (Faculty of Medicine)

465. *Principles of Radiological Diagnosis.*—A series of small group tutorial sessions to acquaint the student with the use of X-ray in diagnosis.

700. *Physics and Technology (Radiography I).*—During the first month of residency training, didactic instruction is given at the British Columbia Institute of Technology in the physics of Diagnostic Radiology and the fundamentals of radiographic technology (radiography). During this one month residency period, the graduate student is trained in radiographic technology by working as a technologist at the Vancouver General Hospital or St. Paul's Hospital. Eight hours daily.

701. *Continuing Instruction in Basic Sciences.*—During the three years of training in Diagnostic Radiology, scheduled and unscheduled instruction is given in physics (one hour per week) and pathology correlated with radiology (one hour per week).

702. *Clinical Investigation or Research.*—Each resident is encouraged to complete an investigative project in each of the three years in Diagnostic Radiology under the supervision of a faculty member, for possible presentation at an annual department meeting.

703. *Visiting Professorships.*—Approximately six internationally recognized authorities in Diagnostic Radiology are invited to visit this department each year for one to five day periods, during which lectures, consultations and small-group seminars are given. Average ten hours each year.

704. *Instruction in Clinical Radiology.*—Daily and weekly departmental teaching sessions are held. In addition, the department participates in ward rounds and seminars with other clinical specialty departments. Eight hours weekly.

705. *Elective Periods.*—During the third year of Diagnostic Radiology for eight hours daily, elective periods of one to six months, as acceptable to the graduate student and the Program Director, for two or more of:
Advanced study in any of the subspecialties listed for the "core" period, Neuroradiology (contrast examinations and computerized tomography). Nuclear Medicine, Mammography, Diagnostic Oncologic Radiology, Peripheral Angiography and Diagnostic Ultra Sound.

710. *Clinical Nuclear Medicine.*—Daily discussions of the clinical applications of Nuclear Medicine. (See Pathology 730).

711. *Progress in Nuclear Medicine.*—Weekly reviews of current literature topics in Nuclear Medicine. (See Pathology 731).

712. *Clinical Investigation/Research.*—Participation in ongoing research projects within the Division. (See Pathology 732).

713. *Quality Correlation in Nuclear Medicine.*—Review of diagnostic Nuclear Medicine procedure. Correlation with other diagnostic tests and final patient diagnosis. (See Pathology 733).

Reading Education (Faculty of Education)

305. (3) *Curriculum and Instruction in Developmental Reading in the Elementary School.*—The reading process and the teaching of basic reading skills from beginning stages through the elementary school. [3-0; 3-0]

472. (1½) *Reading in the Secondary School Classroom: Practical Implications.*—Reading instruction as it relates to the secondary pupil with implications for teaching the secondary-school subjects or working with pupils in related areas, such as library, etc. [3-0; 0-0]

473. (1½) *Materials of Reading Instruction.*—Analysis and evaluation of materials for reading instruction with special emphasis on the materials for use in British Columbia. Prerequisite: Reading Education 305 . [3-0; or 3-0]

474. (1½) *Reading in the Secondary School Classroom: Theoretical Principles.*—The reading process as it relates to the teaching of secondary-school subjects: instructional planning, evaluation, motivation, development of interests, school program development. Prerequisite: Reading Education 472. [0-0; 3-0]

475. (1½) *Corrective Reading.*—Identification and instruction of children needing corrective teaching in reading in the regular classroom. Intensive laboratory practicum. Prerequisite: Reading Education 305 or 472. [2-2; 0-0] or [0-0; 2-2]

476. (3) *Remedial Reading.*—Individual diagnosis and treatment of reading difficulties. Intensive laboratory practicum. Prerequisite: Reading Education 305 or 472 and at least one school year of teaching experience. [2-2; 2-2]

477. (1½) *Special Topics in Reading.*—In-depth study of selected topics in reading. Prerequisite: Reading Education 305 or 472. [3-0; 0-0] or [0-0; 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

544. (1½/3)**d** *Theoretical Bases for Reading Research and Practice.*—A course focussing on the contributions of research in cognitive psychology and physiology to the understanding of the reading process. Prerequisite: Reading Education 305 or 472/74.

561. (1½-6)**c** *Laboratory Practicum.*

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

574. (3) *Supervision of Reading.*—Curriculum analysis and planning. Implications for the administrator, the consultant and supervisor of reading.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

601. (1½-6)**d** *Doctoral Seminar.*

699. *Doctoral Thesis.*

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Rehabilitation Medicine (School of Rehabilitation Medicine, Faculty of Medicine)

201. (1½) *Kinesiology*.—Analysis of specific human motor acts in terms of structural, functional, perceptual and biomechanical considerations as a foundation for the study of subnormal or abnormal performance and movement instruction. [1-1; 1-1]

202. (½) *Clinical Skills*.—Lectures, seminars and practice related to the skills of clinical interviewing, recording data, teaching and motivation. [0-0; 1-0]

204. (1½) *Tests and Measures*.—Selection, administration, recording and interpretation of tests and measures used as part of the evaluation process in rehabilitation. [0-0; 2-2]

205. (1½) *Devices/Equipment*.—Selection, adaptation and use of rehabilitation devices and equipment. [2-2; 0-0]

206. (1) *Physical Treatment of the Musculo-Skeletal System*.—The theory and practice of basic therapeutic exercise and massage techniques as applied to the musculo-skeletal system.

207. (3) *Occupational Therapy Theory and Practice*.—Conceptual frameworks will be employed to solve problems of clients with motor, sensory, cognitive, perceptual and social dysfunctions. The function/dysfunction continuum will be utilized to analyse activities for clients of all ages. [1-4; 1-4]

208. (1½) *Physical Assessment of the Musculo-Skeletal System*.—The theory and practice of basic methods of physical assessment as applied to the musculo-skeletal system.

209. (0) *Clinical Fieldwork, Occupational Therapy*.—Observation and supervised participation in physical disability and psychiatric facilities during eight weeks of the summer.

210. (0) *Clinical Fieldwork, Physical Therapy*.—Observation and supervised participation in a variety of health care facilities for four weeks during the summer.

301. (3) *Medicine and Surgery I, II, III, IV*.—The pathophysiology and medical management of respiratory, musculo-skeletal, neurological, and general medical conditions frequently encountered by occupational and physical therapists in the health care of all age groups. [4-0; 2-0]

302. (1½) *Psychosocial Aspects of Disability*.—Examination of cultural, psychological and social components associated with reactions to disability, illness and dying. Study of principles fundamental to effective relations for adjustment, conflict resolution and coping. [0-0; 3-0]

303. (2) *Occupational Therapy, Clinical Conditions in Psychiatry*.—The etiology, epidemiology, natural history, management and treatment of psychiatric disorders of childhood, adolescence and adulthood. [2-0; 2-0]

304. (1) *Physical Therapy, Musculoskeletal Assessment and Treatment Skills*.—Assessment and treatment related to posture, gait, accessory joint movements, skin and peripheral circulation in children and adults.

305. (1½) *Physical Therapy, Electro and Hydrotherapy*.—The clinical use of electrotherapy, hydrotherapy, selected conductive energy, electromyography, biofeedback and electrodiagnostic procedures. [1½-1½; ½-1½]

306. (1) *Occupational Therapy, Orthotic and Remedial Equipment*.—The construction, adaptation, and utilization of orthotic devices and remedial equipment including measurement and use of supportive aids. [0-0; 0-4½]

307. (1½) *Occupational Therapy, Psychosocial Dysfunction*.—Application of a systematic problem-solving approach to the occupational therapy process in mental health. Content includes theory and intervention strategies employed in the treatment and rehabilitation of psychosocial dysfunction throughout the life span. [1-2; 1-2]

308. (1) *Principles of Physical Therapy, Management of the Musculoskeletal System*.—The clinical application of principles of management to musculosekeletal problems in children and adults.

311. (1) *Leadership and Communication*.—Basic theories, principles and skills of group leadership and interpersonal communication. [1-2; 0-0]

313. (1) *Physical Therapy Management of the Respiratory System*.—Assessment and treatment of common disorders of the respiratory system affecting individuals of all ages. [1-2; 0-0]

314. (1½) *Physical Therapy Management of the Neuromuscular System*.—The assessment and treatment of common disorders of the neuromuscular system affecting individuals of all ages. [0-0; 1½-3]

323. (1½) *Occupational Therapy in Neurorehabilitation*.—The neurodevelopmental approach to occupational therapy for all age groups. Theory, assessment and treatment strategies are included. [0-0; 1-4]

330. (4½) *Clinical Fieldwork, Physical Therapy*.—Six weeks during spring term and twelve weeks during the summer for observation and supervised participation in health care facilities and agencies throughout B.C.

335. (3) *Clinical Fieldwork, Occupational Therapy*.—Observation and supervised participation in a variety of health care settings in B.C. for twelve weeks during the summer.

401. (½) *Medicine and Surgery V*.—The effects, side effects, indications and contraindictations of drugs used in selected conditions. [1-0; 0-0]

402. (1½) *Introduction to Scientific Inquiry*.—Introduction to the principles of clinical research design, scientific writing and clinical data analysis. [2-0; 1½-0]

405. (1) *The Application of Advanced Instrumentation and Computer Technology in Physical Therapy*.—Basic technical components of advanced instrumentation and technology as applied in the management and research of physical disability [1-0; 1-0]

407. (1½) *Occupational Therapy, Advanced Problem-Solving for Physical Dysfunction*.—The case study method in occupational therapy problem-solving for clients of all ages with physical dysfunction. [0-0; 1½-2]

408. (1) *Management and Administration*.—The principles of management of personnel, departmental records and budget as applied to rehabilitation services [0-0; 2-0]

411. (1) *Physical Therapy Management of the Integumentary, Genitourinary & Reproductive Systems*.—The assessment and treatment of common disorders of the integumentary and genitourinary systems and of the needs of the normal and disabled pregnant woman. [1-2; 0-0]

412. (1) *Physical Therapy Management of the Cardiovascular and Peripheral Vascular Systems*.—The assessment and treatment of common disorders of the cardiovascular and peripheral vascular systems affecting individuals of all ages. [1-2; 0-0]

413. (3½) *Physical Therapy, Comprehensive Patient Management*.—A problem solving approach to the comprehensive management of physical impairment, disability and maintenance of fitness of the child and adult. [1½-2; 2-3]

414. (0) *Physical Therapy, Social and Professional Issues*.—The political, social, and cultural issues in the development of physical therapy as a profession. [0-0; 1-0]

415. (1½) *Physical Therapy, Independent Study*.—Content to be designed in consultation with a faculty member. [½-1; 1-2]

416. (1½) *Occupational Therapy, Vocational Rehabilitation*.—Assessment and management of vocational problems with particular emphasis on evaluating work skills, developing work adjustment programs, and use of community resources. [1-3; 0-0]

417. (½) *Health Care Systems*.—Four basic elements of health and rehabilitation systems: facilities, manpower, technology and financial mechanisms. [1-0; 0-0]

418. (1) *Occupational Therapy, Rehabilitation Technology*.—The application of advanced technology to evaluate and assist disabled clients in communication, environmental control, mobility and personal independence. [½-1] [½-1]

420. (3½) *Elements of Neuroanatomy and Neurophysiology*.—An introduction to the structure and function of the human nervous system.

424. (1) *Occupational Therapy, Program Design*.—Seminar sessions and self-directed study requiring students to explore the occupational therapy program design process. [0-0; 1-2]

425. (0) *Occupational Therapy, Social and Professional Issues*.—The political, social and cultural issues in the development of occupational therapy as a profession. [1-0; 0-0]

426. (1½) *Occupational Therapy, Independent Study*.—Content is to be designed in consultation with a faculty member. [½-1; 1-2]

427. (3) *Selected Problems in Rehabilitation*.—Individual and group study of current problems, topics, and trends in rehabilitation medicine. Includes field analysis, literature review, discussion and student projects.

428. (1½) *Occupational Therapy, Advanced Problem-Solving for Mental Health*.—The case study method in occupational therapy problem-solving for clients of all ages with emotional, social and/or cognitive dysfunction. [0-0; 1½-2]

429. (3) *Rehabilitation Seminar*.—A seminar course geared to the needs of participating members. Provide opportunity to gain knowledge of breadth and growth of Occupational Therapy and Physiotherapy with which participants are not familiar.

430. (3½) *Clinical Fieldwork, Physical Therapy*.—Six weeks during the fall term and eight weeks during spring term for observation and supervised participation in institutional and community health care settings throughout B.C. (or elsewhere in Canada — spring term only).

435. (3½) *Clinical Fieldwork, Occupational Therapy*.—Six weeks during the fall term and eight weeks during spring term for observation and supervised participation in institutional and community health care settings throughout B.C. (or elsewhere in Canada — spring term only).

436. (1½) *Occupational Therapy, Ergonomics and Organization of Activity*.—Application of theory and principles of ergonomics, task analysis and environmental adaptations for fulfilment of occupational, educational or vocational roles. [½-1; 1-2]

532. (1½) *See Health Care and Epidemiology 532*.

Religious Studies (Faculty of Arts—See also Hebrew).

100. (3) *Religions of the World*.—An introduction to the major religions of the world (including Judaism, Christianity, Islam, Hinduism and Buddhism), together with the concepts used in understanding religion. [3-0; 3-0]

202. (3) *Introduction to the Study of Western Religious Traditions*.—The origins and development of Judaism, Christianity, Islam. [3-0; 3-0]

204. (3) *Introduction to Asian Religions*.—The religions of India, China, and Japan in their interactions and cultural contexts, including Hinduism, Buddhism, Jainism, Sikhism, Taoism, Confucianism, and Shinto. [3-0; 3-0]

205. (3) *History of the Christian Church*.—A survey of the history of the Christian church from the close of the period of the New Testament to the present day. [3-0; 3-0]

300. (3) *Archaeology of the Ancient Near East. (Also listed as Fine Arts 327.)* [0-2; 0-2]

303. (3) *The Legacy of Ancient Israel*.—A literary-historical survey of the major ideas of the Old Testament (Hebrew Bible), including creation, covenant, kingship, prophecy, death, and afterlife. Attention will be given to the Ancient Near Eastern antecedents of these ideas and to their subsequent development in Jewish and Christian traditions. [2-1; 2-1]

306. (1½) *Archaeology and the Bible*.—The impact of archaeological research on understanding the history and religion of ancient Israel. [0-0; 0-2]

308. (3) *Introduction to Post-Biblical Judaism*.—The development of normative Judaism after the fall of the Second Temple, the collection and arrangement of the Talmud, the Jews in Spain and Western and Eastern Europe, modern Judaism. [3-0; 3-0]

314. (3) *The Origins of Christianity*.—The life and teachings of Jesus of Nazareth; the history, literature and religion of the Christian communities to A.D. 150. [3-0; 3-0]

315. (3) *History of Christian Thought.*—Selected topics with special emphasis on doctrinal change and development, orthodoxy and heresy, tradition and authority, and church and state in the patristic, medieval, Reformation, and modern periods. [3-0; 3-0]

321. (3) *Classics of the Christian Tradition.*—A study of selected texts (in translation) from the second century to modern times. Each text will be studied from the point of view of its historical setting, its intellectual content and its influence on the Christian tradition. The texts chosen will vary from year to year. [0-2; 0-2]

323. (3) *Christianity in the Modern World.*—The interaction between Christianity and the major intellectual, social and cultural developments since 1648 with special attention to the expansion of Christianity and its encounter with urban industrial society. [3-0; 3-0]

326. (3) *Early Medieval Art*—The transformation of Roman Imperial art into the medieval Christian arts of the Byzantine Empire and the Western European Kingdoms, A.D. 100-1000. Offered in alternate years. (Also listed as Fine Arts 331.) [2-1; 2-1]

327. (3) *Architecture of the High Middle Ages.*—A study of the principle monasteries and cathedrals of Western Europe (ca. 1000-1300), with a view to understanding their technical, aesthetic, and theological dimensions as well as the role of contemporary institutions in their creation. Offered in alternate years. (Also listed as Fine Arts 333) [2-1; 2-1]

340. (3) *Heritage of Islam.*—A detailed study of the history, beliefs, institutions, and literature of Islam. Not given every year. [3-0; 3-0]

341. (3) *Islamic Art and Archaeology.*—A study of the artifacts of Islam as an expression of Islamic beliefs. (Also listed as Fine Arts 359.) [0-2; 0-2]

354. (3) *The Hindu Religious Tradition.*—Formation of Hinduism through the various periods of its history in interaction with indigenous movements and foreign religions. An overview of philosophical schools, religious doctrines, rituals, myths, and religious organizations. [3-0; 3-0]

361. (1½) *The New Religions of Japan.*—A critical examination of the new religions of Japan and their relation to traditional Japanese religions and to new religious movements elsewhere. [0-0; 3-0]

364. (1½) *Buddhism in India and East Asia.*—The historical development and spread of Buddhism in its cultural contexts, from India and Central Asia to China, Korea, and Japan. Attention will be given to the whole scope of Buddhist beliefs and practices, including institutions, leadership, philosophy, and popular devotion. [3-0; 0-0]

365. (1½) *Chinese Religions Until the Han Dynasty.*—The historical development of Chinese religions from pre-history until the second century C.E. Attention will be given to state rituals, ancestor worship, shamanism, the quest for immortality, and religious dimensions of early Chinese philosophy. Not offered every year. (Also listed at Asian Studies 365.) [3-0; 0-0]

366. (1½) *Taoism, Buddhism, and Popular Religion in China.*—Chinese religions from the second to the twentieth centuries C.E. Attention will be given to historical development, institutions, rituals, beliefs and ethical values, and to the interaction of religion with Chinese culture as a whole. Not offered every year. (Also listed as Asian Studies 366). [0-0; 3-0]

367. (1½) *Approaches to Zen.*—A critical examination of the historical and philosophical background of Zen, its contemporary situation, literary and artistic expressions and recent developments. [2-1]

370. (3) *Concepts & Methods in the Study of Religion.*—Required of majors and honours students in their third year. Open to others by permission of instructor. [0-3; 0-3]

390. (1½) *Jews and Christians.*—Aspects of Jewish-Christian relations from the beginnings of Christianity to the present day. (Not available for credit in the Major and Honours program). [2-1]

391. (1½) *Religion and Psychological Thought.*—An examination of some influential intrapsychic theories of religion, together with some traditional psychologies of spiritual development. (Not available for credit in the Major and Honours program.) [2-1]

403. (1½) *Job and the Problem of Suffering.*—A seminar on the Book of Job and the history of its interpretation. [0-2]

407. (1½) *Topics in Talmudic Judaism.*—Selected problems in the development and content of the Talmud. [0-2; 0-0]

408. (1½) *Topics in Medieval Judaism.*—The work of Maimonides and other Jewish philosophers, early developments in Jewish mysticism, the Jews as a minority culture in Islamic and Christian lands. [0-0; 0-2]

409. (1½) *Topics in Modern Judaism.*—The Jews in the ghetto culture, Hasidism, the Emancipation, Reform, Orthodox and Conservative Movements. [0-0; 0-2]

414. (1½) *The Gospels and the Historical Jesus.* [0-2; 0-0]

415. (1½) *The Life and Thought of Paul of Tarsus.*—Prerequisite: Religious Studies 414. [0-0; 0-2]

420. (3) *Religion in Canada.*—An examination of Canadian religious development with special reference to the separation of church and state, the rise of denominationalism and religious pluralism, secularization and ecumenicity, and the emergence of new religious movements. [3-0; 3-0]

421. (1½) *Contemporary European Christian Thought.* [0-2; 0-0]

422. (1½) *Contemporary American Christian Thought.* [0-0; 0-2]

425. (3/6)**c** *Topics in Christian Mysticism.*—An examination of selected literature from Christian mystical traditions. Those taking the course for six units (by permission of the instructor) will be expected to attend additional tutorial sessions, and to undertake further reading of literary material, further exploration of methodological problems and the writing of a major analytical paper. [0-2; 0-2]

430. (3/6)**d** *Readings in Chinese Religious Texts.*—Selected readings from primary texts in Confucianism, Taoism and Buddhism. Prerequisite: Chinese 301 or equivalent. The course may be taken twice for credit. (Also listed as Asian Studies 430.) [3-0; 3-0]

431. (1½) *The Buddhist Religious Tradition.*—Seminar on Buddhist myth and ritual, monasticism and meditation disciplines, and their influence on the culture of Buddhist peoples. Prerequisite: Religious Studies 364 or its equivalent. [0-3; 0-0]

448. (1½) *Seminar in the History of the Religion of Islam.*—A topic relevant to the study of Islam as a religion: e.g., the text and doctrines of the Qur'an; the Hadith (or Traditions) of the Prophet; Islamic Law; mysticism in Islam; the Shi'ah and the Isma'ilis. Not offered every year. (Consult the Departmental brochure for the topic to be offered). [0-2]

449. (1½) *Seminar in the History of Muslim-Christian Relations.*—Topics in Muslim-Christian relations with special reference to the Middle Ages: e.g., the Crusades (with emphasis on the Muslim point of view); Muslim Spain (with special reference to Christians and Jews as subjects); attitudes of Christians and Muslims towards each other in their literature. Not offered every year. (Consult the Departmental brochure for the topic.) [0-2]

452. (3) *Readings in Hindu Religious Texts.*—Representative texts, in translation, of the Vedic, Epic, Puranic, Classical, Medieval, and Modern periods. Emphasis in the second term on texts of particular periods, movements, or sects, depending on the students' needs and interests. Those with the necessary preparation may read some texts in the original languages. [3-0; 3-0]

479. (1½/3)**c** *Directed Studies.*—Reading and, where appropriate, other research on a topic arising in the discipline, arranged by agreement between the student and the instructor.

499. (3/6)**c** *Honours Essay.*

500. (1½/3)**c** *Topics in Biblical Studies.*—Studies in the history, literature, canon and text, and the religious thought of the Old and New Testaments. This includes the study of the cultural and religious milieu out of which these documents arose. Such studies require a competence in the canonical languages (Biblical Hebrew and/or Koine Greek), normally achieved by not less than two years of study.

502. (1½/3)**c** *Topics in Judaism.*—Studies in the texts (in translation), history and religious thought of Judaism after the close of the Biblical Period.

503. (1½/3)**c** *Topics in the Post-Biblical Christian Tradition.*—Studies in post-Biblical history, documents and religious ideas of the Christian tradition. Depending on the area of concentration, language requirements include either Latin or Greek and a reading knowledge of French or German.

510. (1½/3)**c** *Topics in Selected Areas of the Religious Texts and Traditions of South and East Asia.*—Studies in texts, history and religious thought of the Hindu or Buddhist tradition. Depending on the area of concentration, a competence is required in Sanskrit, Chinese, Japanese, or Tibetan, usually achieved by not less than two years of study.

512. (1½/3)**c** *Topics in Buddhism.*—Specialized studies in texts, history and religious thought of the Buddhist traditions. Depending on the area of concentration, language requirements include a knowledge of either Sanskrit, Chinese, Japanese or Tibetan, usually achieved by not less than two years of study.

514. (1½/3)**c** *Topics in Islam.*—Studies in the literature (in translation), history and religious thought of Islam in Western Asia and North Africa from its inception to the rise of the Ottoman Empire.

531. (3) *Graduate Seminar.*

549. (3/6)**c** *Master's Thesis.*

631. (3/6)**d** *Problems and Methods in Buddhist Studies.*—An examination of the primary religious, philosophical and historical canonical literature of Buddhism and of the exegetical materials in Western and Eastern languages dealing with this literature. Attention will be focused on identification of religious problems and the methods employed to solve these in secondary sources.

649. *Ph.D. Thesis.*

Restorative Dentistry (See course listings under Dentistry)

Resource Ecology (Institute of Animal Resource Ecology)

500. (1½-6)**d** *Resource Science Workshop.*—Resource use problems studied comprehensively using computer simulation techniques. Faculty and students from different disciplines act as an interdisciplinary team studying specific resource problems with ecological, economic, demographic and social dimensions. Techniques and methods of simulation models are emphasized to show their value in integrating knowledge, defining policy and facilitating communication. Several sections with different emphasis offered each year. Prerequisite: permission of instructor.

Romance Studies (Department of Hispanic and Italian Studies, Faculty of Arts)

420. (3) *Studies in Romance Languages and Literature.* [3-0; 3-0]

520. (3) *Studies in Romance Languages and Literature.*

Russian (Department of Slavonic Studies, Faculty of Arts)

Also see courses on Russian and East European Literatures under Slavonic Studies.

100. (3) *Beginners' Russian.*—Emphasis on reading and writing, with some oral practice. Special sections are available for Science students. (Students interested primarily in acquiring a reading knowledge of Russian should enrol in Russian 325.) [3-1; 3-1]

110. (6) *Accelerated Russian.*—Emphasis on learning to understand the spoken language and to express oneself in it. [5-2; 5-2]
200. (3) *Second-Year Russian.*—A special section is provided for science students. Prerequisite: Russian 100. [3-1; 3-1]
215. (1½) *Russian Practice.*—Prerequisite: permission of instructor. [2-0; 2-0]
300. (3) *Intermediate Russian.*—Syntax and composition. Prerequisite: Russian 110 or 200. [3-0; 3-0]
303. (3) *Introduction to Russian Linguistics.*—Required for honours students in Russian and recommended for majors. Prerequisite: Two years of Russian. [3-0; 3-0]
305. (1½/3)**d** *Readings in Contemporary Russian.*—Prerequisite: Russian 110 or 200. [3-0] or [3-0; 3-0]
315. (1½) *Advanced Russian Practice.*—Oral practice emphasizing Soviet life and culture. Prerequisite: permission of the instructor. [2-0; 2-0]
325. (3) *Russian for Reading Knowledge.*—This course provides a reading knowledge of Russian, sufficient to enable students to understand scientific and scholarly material. Basic grammar and practice in the translation into English of texts in the natural sciences, social sciences and humanities. Not for credit towards a Major or Honours program in Russian. [3-0; 3-0]
349. (1½) *Tutorial in Russian Literature.*—Emphasis on literary criticism. Recommended for Russian Majors and Honours students; open by permission to Majors in Slavonic Area Studies. [0-2; 0-2]
400. (3) *Advanced Russian.*—Prerequisite: Russian 300. [3-0; 3-0]
425. (3) *Translation: Russian into English.*—Material for translation will be selected at the appropriate level and according to students' areas of specialization. Prerequisite: Russian 325 or permission of the instructor. [3-0; 3-0]
430. (3) *Studies in Nineteenth Century Russian Poetry.*—Lectures given in Russian. [3-0; 3-0]
431. (3) *Studies in Nineteenth Century Russian Prose.* [3-0; 3-0]
432. (3) *Studies in Russian Drama.* [3-0; 3-0]
433. (1½/3)**d** *Studies in Twentieth-Century Russian Literature: Pre- and Post-Revolutionary.* [3-0; 3-0]
449. (3) *Honours Essay.*
500. (1½/3)**d** *Studies in Bibliography.*
501. (1½/3)**d** *Seminar in Criticism.*
502. (1½/3)**d** *Comparative Slavic Linguistics.*
509. (3) *Old Church Slavonic.*
510. (3) *History of the Russian Language.*
515. (1½/3)**d** *Russian Linguistics: Phonemics.*
516. (1½/3)**d** *Russian Linguistics: Morphophonemics.*
517. (1½/3)**d** *Russian Linguistics: Syntax.*
518. (1½/3)**d** *Russian Linguistics: Lexicology.*
519. (1½/3)**d** *Topics in Slavic Linguistics.*
529. (1½) *Old Russian Literature.*
530. (1½) *Eighteenth Century Russian Literature.*
531. (3) *Studies in the Russian Novel.*
532. (3) *Russian Drama and Theatre.*
533. (3) *Modern Russian Poetry.*
535-539. (1½/3)**d** *Topics in Russian Literature.*
545. (1½/3)**c** *Directed Studies.*
549. (3/6)**c** *Master's Thesis.*
649. *Ph.D. Thesis.*

Sanskrit—See Asian Studies: Indic Languages.

Science Education (Faculty of Education)

190. (3) *General Science.*—The major ideas and techniques in the biological sciences (biology, botany, zoology) and physical sciences (physics, chemistry, astronomy, and geology). While experience is provided in studying science in a systematic way, concepts are interpreted for use in teaching at the elementary school level. [3-2; 3-2]
309. (3) *General Science for Elementary School Teachers.*—An advanced course in general science with applications to elementary school science teaching. Recent developments in the sciences introduced. Prerequisite: Science Education 190 or three units of first year laboratory science. [3-2; 3-2]
321. (1½) *Curriculum and Instruction in Elementary Science.*—A study of (a) the curriculum organization in science for the elementary grades; (b) techniques and strategies of instruction in science for these grades. [3-0; or 3-0]
401. (1½) *Curriculum and Instruction in Agriculture (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in agriculture, or Director's permission. Co-requisite: Education 499. [0-0; 3-0]
402. (1½) *Curriculum and Instruction in Biology (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in biology, or Director's permission. Co-requisite: Education 499. [0-0; 3-0]
403. (1½) *Curriculum and Instruction in Chemistry (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in chemistry, or Director's permission. Co-requisite: Education 499. [0-0; 3-0]
404. (1½) *Curriculum and Instruction in Earth and Space Science (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in earth and space science, or Director's permission. Co-requisite: Education 499. [0-0; 3-0]
405. (1½) *Curriculum and Instruction in General Science (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in one of the specific sciences, or Director's permission. Co-requisite: Education 499. [3-0; 0-0]
406. (1½) *Curriculum and Instruction in Physics (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration of major in physics, or Director's permission. Co-requisite: Education 499. [0-0; 3-0]
409. (1½/3)**d** *Science Education.*—An advanced course in problems of practice in four areas of teaching elementary science—aims and policy, organization and administration, curriculum, and teaching-learning. Problems are considered in their theoretical contexts. Prerequisite: Science Education 321; and Science Education 190 or 3 units of first year laboratory science. [2-2; 2-2]
508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.
510. (1½/3)**d** *Problems in Curriculum Development in Science Education.*—Problems of practice in the development of science curricula. Special emphasis is given to science curricula in B.C.
511. (3) *Seminar in Science Education.*
561. (1½-6)**c** *Laboratory Practicum.*
565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.
580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.
598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.
599. (3/6)**c** *Master's Thesis.*
601. (1½-6)**d** *Doctoral Seminar.*
699. *Doctoral Thesis.*

Slavonic Area Studies—see Faculty of Arts.

Slavonic Studies (Faculty of Arts)—Also see courses under: Polish, Russian, Czech/Slovak, Ukrainian

The courses listed below do not require the knowledge of any Slavic language.

105. (3) *Introduction to Russia and Eastern Europe.*—Although the course deals primarily with the cultural heritage and major historical events, students will also be introduced to the geography, ethnic composition, and economic and social structure of the area. [3-0; 3-0]
110. (1½) *Introduction to Russian Culture.*—Salient features of Russian culture. [3-0]
206. (1½/3)**d** *Major Russian Writers in Translation.*—Russian authors (from Turgenev to Solzhenitsyn) who have made an impact on the world; their lives, writings and thought. [3-0; 3-0]
306. (3) *Russian Literature in Translation.*—A comprehensive historical and critical presentation with emphasis on nineteenth- and twentieth-century writers. [3-0; 3-0]
307. (1½/3)**d** *Modern East European Literatures in Translation.*—An introduction to the modern East European writers (Czech, Polish, Russian, South Slavic, Ukrainian) with emphasis on the interaction between politics and literature. [3-0; 3-0]
308. (1½/3)**d** *Tolstoy and Dostoyevsky in Translation.* [3-0; 3-0]
310. (1½/3)**d** *Studies in Russian Culture.*—Emphasis on art, architecture, and music as part of pre-revolutionary Russian life. Prerequisite: Slavonic Studies 110. [3-0] or [3-0; 3-0]
340. (3) *The Peoples of the Soviet Union.*—Past and present geographical distribution; historical background; physical and cultural anthropology with special emphasis on the non-Slavic peoples; their influence on Russian culture; integration of national minorities. [3-0; 3-0]
446. (1½) *Women in Russia.*—An examination of the roles and images of women in Russian and Soviet folklore, literature and history. [3-0]
447. (1½) *Seminar in Slavonic Area Studies I.* [0-2; 0-0]
448. (1½) *Seminar in Slavonic Area Studies II.* [0-0; 0-2]
542. (3) *Comparative Slavonic Literature.*
545. (1½/3)**c** *Directed Studies.*
546. (3) *Russian Thought and Culture.*

Social Studies Education (Faculty of Education)

322. (1½) *Curriculum and Instruction in Social Studies in the Elementary School.* [3-0; or 3-0]
401. (1½) *Curriculum and Instruction in Social Studies (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in Canadian studies or one of the social studies disciplines, or Director's permission. Co-requisite: Education 499. [3-0; 0-0]
402. (3) *Social Studies.—Advanced Course in Elementary Social Studies.*—Study of recent research and curriculum developments with particular reference to the design of classroom materials. Prerequisite: Social Studies Education 322. [3-0; 3-0]

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403. (1½) *Curriculum and Instruction in Canadian Studies (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in Canadian studies, or Director's permission. Co-requisite: Education 499. [0-0; 3-0]

404. (1½) *Curriculum and Instruction in Geography (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in social studies (emphasis on geography), or Director's permission. Co-requisite: Education 499. [0-0; 3-0]

405. (1½) *Curriculum and Instruction in History (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration or major in social studies (emphasis on history), or Director's permission. Co-requisite: Education 499. [0-0; 3-0]

406. (1½) *Curriculum and Instruction in Social Sciences (Secondary).*—Curriculum planning; teaching methods and strategies. Prerequisite: a completed concentration in social studies (emphasis on social sciences), or Director's permission. Co-requisite: Education 499. [0-0; 3-0]

469. (1½/3)**c** *Introduction to Current Practices in Values Education.*—Examination of recognized approaches to values education, including strategies, curriculum materials, rationale and theory, and research evidence. Critical examination and practical applications of approaches will be emphasized. [3-0; 3-0]

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

Social Work (School of Social Work, Faculty of Arts)

300. (3) *Canadian Social Services I.*—The course involves a review and analysis of Canadian social policy, social welfare programs and social services, including the constitutional, economic, legal and administrative factors influencing their development. Enrolment is limited to students in the B.S.W. programs, except by permission of the School.

301. (1½) *Social Welfare in the Modern Era.*—An introduction to modern social welfare organization emphasizing the philosophy, growth and legislative developments of this significant item of public expenditure in industrialized societies. The focus is on the Canadian experience with some international comparison. Available for credit to students in the Faculty of Arts. [3-0;0-0]

302. (1½) *Family and Child Welfare in the Modern Era.*—This course focuses on social services to families and children, a major activity within the broader social welfare field. Prerequisite: SOWK 301. Available for credit to students in the Faculty of Arts. [0-0; 3-0]

310. (6) *Social Work Intervention I.*—The course surveys the main social work methods, explores their differential use, and provides supervised experience in applying the related techniques and skills involved in professional practice. The course involves two days of field work per week, including three hours of seminars or the equivalent. Enrolment is limited to students in the B.S.W. programs.

320. (3) *Social Work Research.*—The theory and conduct of social research as applied to social welfare problems and social work practice, including the design and conduct of a related individual or group research project. Enrolment is limited to students in the B.S.W. programs, except by permission of the School.

335. (3) *Human Behaviour and Social Environment.*—Examination of factors underlying the functioning of systems —persons, families, communities —that are of special concern to Social Workers, including study of stressful situations commonly encountered by Social Work clients, e.g., separation, illness and disability, poverty and other forms of marginal status, and emphasizing implications for Social Work practice, social service programs. Enrolment is limited to students of the School of Social Work, except by permission of the School.

336. (1½) *Application of Social Science Concepts to Social Work Practice.*—Analysis of the application of selected social science concepts and theories in social work practice at the levels of both policy and services development and direct intervention with clients. Enrolment is limited to students in the School of Social Work. [3-0; 0-0]

400. (1½) *Canadian Social Services II.*—The course involves identification, analysis and assessment of issues and problems in Canadian social welfare policy and in the organization, delivery and effectiveness of resulting programs and services. Prerequisite: S.W. 300. Enrolment is limited to students in the B.S.W. programs.

410. (6) *Social Work Intervention IIA.*—The course reviews and applies social work knowledge relevant to professional intervention with individuals, families and small groups through combined theory-practice seminars and supervised field experience. The course involves two days of field work per week, including three hours of seminars or the equivalent. Prerequisite: SOWK 310. Enrolment is limited to students in the B.S.W. program.

415. (6) *Social Work Intervention IIB.*—The course reviews and applies social work knowledge relevant to professional intervention with community groups and organizations through combined theory-practice seminars and supervised field experience. The course involves two days of field work per week, including three hours of seminars or the equivalent. Prerequisite: SOWK 310. Enrolment is limited to students in the B.S.W. program.

430. (1½/3) *Special Studies in Social Work.*—Lectures, seminars and/or individual tutorials to develop knowledge and skills in relation to a defined theory, policy or practice problem or client population. Enrolment is limited to students in the B.S.W. program, except by permission of the School.

511. (3) *Social Welfare Problems: Family Needs.*—Analyses of theories, perspectives and issues bearing upon family needs and functioning, as related to preventive and remedial social work intervention.

512. (3) *Social Welfare Problems in the Health Field.*—Analyses of theories and perspectives on health and illness, as these affect social work intervention. Study of selected health problems for their social work implications.

513. (3) *Social Welfare Problems: Socio-Economic Needs.*—Analyses of selected perspectives, issues and problems concerning availability and utilization of societal resources and rights affecting the welfare of persons of concern to the social worker. Includes study of the production and distribution of income from employment, of social utilities, of social services, and of social security programs and social rights.

521. (1½/3)**d** *Social Policy Development and Program Planning for Families.*—Study of policies and programs, their formulation and development, bearing upon family life and the care and protection of children and the aged. Critical analyses of the validity, relevance and effectiveness of selected policies and programs.

522. (1½/3)**d** *Social Policy and Program Planning in the Health Field.*—Analysis and assessment of policies, programs and delivery systems in health services, with particular emphasis on inter-organizational and inter-professional arrangements and relationships and on health care financing and delivery in the context of comprehensive systems of social security.

523. (1½/3)**d** *Socio-Economic Policy and Program Planning.*—The course analyses and assesses methodologies in socio-economic policy formulation and related programming, with particular reference to the development of the Canadian social security and social service systems, to the role of various professional and other interest groups and to the implications of policy options and alternative program designs.

530. (1½/3)**d** *Social Services Management.*—Processes and techniques used to design and administer social service programs including methodologies to improve their organization, co-ordination and delivery; and drawing upon systems concepts, and concepts from various theories of organizational behaviour, decision-making, planning and communications.

540. (1½) *Comparative Theories of Social Work Practice.*—Selective and/or comparative study of intervention theories and related practice with individuals, families and other small groups.

541. (1½/3)**d** *Social Work Practice and the Family.*—Comparative analysis of social work practice methodologies for the treatment of individual, family and other small group problems and/or for social change and social provision supportive of family life.

542. (1½/3)**d** *Social Work Practice in the Health Field.*—Comparative analysis of social work practice methodologies related to health needs and health settings and/or for social change and social provision relevant to the health needs of individuals and families.

543. (1½/3)**d** *Social Work Practice and Socio-Economic Needs.*—Comparative analysis of theories and methodologies for social work practice relevant to socio-economic needs, with particular emphasis on social planning and other forms of planned action whereby individuals, groups and organizations seek to influence socio-economic problems, policies and programs.

549. (3/4½)**d** *Master's Thesis.*

551. (3/6)**d** *Research Concepts in Social Work Family Practice.*—Review of research related to family practice theories, evaluation of family-oriented programs and selected family practice and policy issues. Design and execution of research projects in family practice.

552. (3/6)**d** *Research Concepts in Social Work Health Practice.*—Review of research on the social aspects of health functioning and on the impact of social policies and services in health settings. Design and execution of social work research projects in health settings.

553. (3/6)**d** *Research Concepts in Socio-Economic Needs.*—Review of research on socio-economic needs and problems and in related social welfare and social security programs. Design and execution of social work research projects concerned with socio-economic needs and programs.

560. (3/4½)**d** *Directed Field Studies in Social Work.*—Planned field work for learning and testing a mode or modes of intervention, related to the method specialization in the student's MSW program concentration.

570. (1½/3)**d** *Directed Studies in Social Work.*

Sociology (Faculty of Arts)

Note: For admission requirements for Third and Fourth Year Courses, see Sociology entry under Arts.

100. (3) *Understanding Culture and Society.*—Sociological and anthropological perspectives on modern and traditional societies. Topics may include human origins, cultural, diversity, language and communication, technology, inequality, conflict and change. Same course as Anthropology 100. [3-0; 3-0]

200. (3) *Introduction to Sociology.*—Introduction to the problems and analysis of social structure and processes. Basic sociological concepts will be introduced and their application illustrated with reference to various areas of the discipline. The course will include a survey of methods and techniques, major theoretical trends and emphases, and the representative works of major contributors to sociology. [3-0; 3-0]

201. (1½/3)**d** *Ethnic Relations.*—(same course as Anthropology 201).

210. (3) *Canadian Social Structure.*—Descriptive and analytic survey of such features as demographic characteristics, class structure, ethnicity, and regional variation in Canadian society, as a basis for understanding current social issues. [3-0; 3-0]

213. (1½/3)**d** *Women in Comparative Perspective.*—(Same course as Anthropology 213).

214. (1½/3)**d** *The Family in Cross-Cultural Perspective*.—A cross-cultural comparison of family and kinship to provide an understanding of variations in the structure and meaning of marriage relations, forms of domestic organization, the sexual division of labour, property, and inheritance. (Same course as Anthropology 214.) [3-0] or [3-0; 3-0]

220. (3) *Sociology of Life-Styles*.—A study of living styles in terms of the on-going organization of gestures, activities, and modes of dress into identifiable patterns which members of society recognize, label, and locate in moral terms. Special attention is given to the influences which lead people to adopt different patterns. [3-0; 3-0]

240. (1½/3)**d** *Introduction to Social Interaction*.—A general introduction to the literature on social interaction, with an emphasis on group (as opposed to individual) processes and behaviour. Topics to be included are: status, power and prestige, distributive justice, marginality and social control, authority relations, and group structure and membership, all to be studied in the context of a variety of groups, such as families, formal organizations, communities, and friendship groups. The methods, findings, and uses of experimental and non-experimental research will be examined, and cross-cultural evidence discussed. [2-1] or [2-1; 2-1]

250. (1½/3)**d** *Crime and Society*.—Crime as a social phenomenon, with emphasis on the changing definitions of crime in relation to social and political change in Canadian and other societies. The scope and nature of the crime problem, the growth of criminology as a science and profession, and relationships between components of state criminal justice systems. [3-0] or [3-0; 3-0]

301. (1½/3)**d** *Sociology of Development and Underdevelopment*.—Processes of social change in the Third World and other developing countries. Major themes stress the relationship between urbanization and industrialization; modernization and ethnic conflict; imperialism, neo-colonialism, and foreign aid; and intra-national modernization problems such as regional underdevelopment in industrial societies. [3-0] or [3-0; 3-0]

302. (1½/3)**d** *Ethnic and Racial Inequality*.—A critical examination of classical and contemporary theories and research evidence concerning ethnic and racial inequality at the societal and interpersonal levels. [3-0] or [3-0; 3-0]

310. (3) *Canadian Society*.—Examination of selected features of the social organization of Canadian society which will include, for example, the relationships between industrial organization and other social institutions, and processes, such as family structure, welfare systems, crime rates, ethnic relations, industrial and political conflict. [3-0; 3-0]

318. (1½) *Statistical Methods I*.—(Same course as Anthropology 318.) A study of statistical methods. Organizing, displaying and summarizing data. Inductive inference based on elementary probability models including estimation and hypothesis testing. This course, taught by the Department of Statistics, is identical with Statistics 203. As Sociology 318, it is open only to major students in Sociology. Prerequisite: Mathematics 11. [3-0]

330. (3) *Population Change and Its Socio-Economic Implications*.—Projection and prediction of population growth and current family planning programs. Techniques in demographic analysis. [3-0; 3-0]

350. (3) *Theoretical and Methodological Problems in Sociology*.—Sociological theories and their relationship to methodological issues in the discipline. The course will examine procedures by which sociological explanations are made, problems of objectivity in sociology, and current topics in sociological theory. [3-0; 3-0]

352. (1½/3)**d** *Organizations*.—Theory and description of the structure, process, and change of bureaucratic organizations in various settings. [3-0] or [3-0; 3-0]

354. (1½/3)**d** *Community Studies*.—Study of the organization of human communities; a focus upon collective activities including family, work, neighbourhood and formal and informal networks. [3-0] or [3-0; 3-0]

361. (3) *Social Stratification*.—Tendencies toward equality and inequality; manifestations of inequality (occupation, education, ethnic groups, income, power) and their consequences; caste and class features of major stratification systems; theories of social class; stratification profile of contemporary industrial societies. [3-0; 3-0]

366. (3) *Principles of Social Organization*.—An introduction to basic concepts for the analysis of social organization. Emphasis is on the processes or practices which produce a socially constructed reality and on the distinctive features of social organization in contemporary society. [3-0; 3-0]

368. (3) *Deviance and Social Control*.—An analytic framework for the study of the generation and control of deviant activities, with particular emphasis on societal processes directed to the recognition and organizational treatment of "deviants" as a phenomenon. Theoretical issues will be stressed rather than social problems and their remedy. [3-0; 3-0]

380. (1½) *Introduction to Social Survey Design and Analysis*.—Questionnaire design, interviewing, sampling, and analysis of survey data. [2-1]

381. (1½) *Experimental Research in Sociology*.—The nature of experimentation. Various types of experimental design and of laboratory and field techniques. The advantages and limitations of experiments in sociological research. Some ethical questions regarding experimentation. [2-1]

382. (1½) *Socio-Ethnographic Research Methods in Sociology*.—Methods for studying the procedures by which people in everyday life achieve accountable results. [0-3]

383. (1½) *Methods of Comparative Analysis in Sociology*.—Strategies, research methods, and limits of comparison; the use of socio-historical data for the comparative analysis of social formations and their transformations; and the use of the comparative method as a means of generating and testing theory. [3-0]

400. (3) *History of Social Thought*.—The history of sociological thought, with particular reference to the classical works of outstanding figures and the major trends. [3-0; 3-0]

410. (1½/3)**d** *Special Studies in Canadian Society*.—Selected areas of study relating to Canadian Society such as B.C. Studies, French Canada's demographic problems; rural communities; social welfare and community programs in Canada. The department should be consulted regarding selections to be given in any one year. Prerequisite: Sociology 310. [3-0] or [3-0; 3-0]

411. (1½) *Applied Sociology*.—The application of sociology by individuals, groups or organizations for purposes of understanding, management and control, and identifying reactions to both proposed changes and consequences of change. [3-0; 0-0]

412. (1½) *Social Impact Assessment*.—A study of major forms of applied research, and consideration of ethical issues involved, using examples from criminology, health care, community planning, organization, marketing, social welfare and regional economic development. Sociology 411 recommended. [0-0; 3-0]

413. (1½/3)**d** *Family and Kinship*.—A cross-cultural survey of ways of defining family relationships and kinship organizations, including theoretical analysis as well as case studies. (Same course as Anthropology 413.) [3-0] or [3-0; 3-0]

418. (1½/3)**d** *Social Statistics*.—(Same course as Anthropology 418.) Primary emphasis on applications of statistical techniques to quantitative and qualitative data in both Anthropology and Sociology. Prerequisite: Anthropology 318 or Sociology 318, or permission of instructor. [3-0] or [3-0; 3-0]

425. (3) *Urban Sociology*.—Demographic, behavioural and organizational aspects of urban structures and of urbanization in different societies and periods. [3-0; 3-0]

433. (1½/3)**d** *Directed Studies*.—General reading and/or a research undertaking, within the agreement, and under the supervision, of a faculty member in the department selected by the students.

449. (3-6)**d** *Honours Tutorial*.—Will require the presentation of at least one research paper.

450. (3) *Theoretical Problems*.—Contemporary sociological thought with respect to fundamental topics in theory. [3-0; 3-0]

453. (3) *Work and Leisure*.—The conditions under which men and women make a living—organization of work; technology of production; control of the means of administration. Consequences of work organization for activities at work and at leisure—communication and cooperation at work; composition of daily activities; participation in voluntary associations. Problems of individual choice and social constraint. Research literature from several countries. [3-0; 3-0]

460. (1½/3)**d** *Sociology of Special Geographical Areas*.—The description of areas to be covered will be announced each year. [3-0] or [3-0; 3-0]

461. (1½/3)**d** *Political Sociology*.—Study of the social foundations of political order and the social aspects of political processes; includes a review of various socio-political ideologies, elite formations, political parties and interest groups, political reform, reactionary and revolutionary movements, and a general examination of the relationship between social structure and political power. [3-0] or [3-0; 3-0]

462. (3) *Social Change*.—Study of the interrelationships between modernization, political thought, and social structure; comparative survey of current trends in the institutional foundations of organized human activities; theories of social change. [3-0; 3-0]

463. (1½/3)**d** *Sociology of Religion*.—Description and analysis of various religious groups: organization and leadership, relationships to the state and other institutions, religious statistics, problems of definition of "religion"; theories of religion: functionalist, Marxist, psycho-analytic. [3-0] or [3-0; 3-0]

464. (1½/3)**d** *Social Movements*.—A study of the sources, stages, and effects of social movements in developing and modernized societies. [3-0] or [3-0; 3-0]

465. (3) *Sociology of the Arts*.—An examination of the arts—as social practices from the standpoint of the relationships among artists, critics, patrons, and public; and the social institutions through which these relationships are structured. [3-0; 3-0]

466. (1½/3)**d** *Sociology of Education*.—Contemporary trends in the educational process, particularly the university setting and its relationship to community and social structure; comparative survey of educational institutions and their respective socio-economic contexts; social class biases in educational training. [3-0] or [3-0; 3-0]

467. (1½/3)**d** *Sociology of Knowledge*.—An analysis of the relationship of ideas to social life in areas such as politics, science, education, religion, the professions, and the arts. [3-0] or [3-0; 3-0]

470. (1½/3)**d** *Sociology of Crime and Justice*.—Critical examination of specific forms of crime and delinquency in relation to the criminal justice system including law, enforcement, and corrections. Issues selected for study will be further scrutinized within the cultural framework of ethics, morality, and social justice. [3-0] or [3-0; 3-0]

472. (3) *Ethnomethodology*.—The study of everyday life conceived as the outcome of the methodical procedures undertaken by members of a society for the achievement of accountable actions. [3-0; 3-0]

473. (3) *Sociology of Mental Illness*.—A sociological approach to the meaning of mental illness; the organization of psychiatric treatment; problems in the explanation of the distribution of mental illness in a population. [3-0; 3-0]

474. (3) *Professions and Occupations*.—A treatment of work as one of the sources of massive stability and standardization in everyday life. The properties of work-settings and their associated practices will be a prime focus for independent fieldwork by students. [3-0; 3-0]

475. (3) *Interpersonal Relations*.—A self-analytic seminar for the study of group interaction and social conflict processes; interdisciplinary reading materials and assignments complement analysis of on-going group and individual behaviour. [3-0; 3-0]

477. (1½/3)**d** *Socialization*.—Study of the acquisition of membership in childhood social structures. Conceptual treatments of the child's learning to operate as a member of a culture are derived from the analysis of speech. [3-0] or [3-0; 3-0]

481. (1½/3)**d** *Interaction in Small Groups*.—Analysis and discussion of small group research, including laboratory and field studies as well as experimental and non-experimental work. Topics may include leadership coalition formation, group cohesiveness, socialization, reactions to deviant behaviour, interpersonal evaluation, and communication. [2-1] or [2-1; 2-1]

495. (1½/3)**d** *Advanced Studies in Sociology*.—An intensive examination of selected topics in Sociology. The department should be consulted regarding areas for study in a given year. [3-0] or [3-0; 3-0]

501. (1½) *Foundations of Sociological Thought.*—A critical survey of classical sociological thought and the theoretical works which have shaped the discipline of sociology.

502. (1½) *Contemporary Sociological Theory.*—Theoretical trends, issues,and perspectives in contemporary sociology, including problems of theory formation and the relation of theory and research.

503. (1½) *Methodology of Sociological Inquiry.*—The nature of sociological understanding and explanation, including a critical review of issues in the theory of methods.

504. (1½) *Research Design and Techniques.*—Sociological research design and the analysis and interpretation of data.

505. (1½/3)**c** *Tutorial in Sociological Theory.*—(Prerequisite: Sociology 501 and 502, or equivalent.)

506. (1½/3)**c** *Tutorial in Research Methods.*—(Prerequisite: Sociology 503 and 504, or equivalent.)

510. (1½/3)**d** *Seminar in Community Studies and Demography.*

515. (1½/3)**c** *Tutorial in Community Studies and Demography.*—Prerequisite: Sociology 510.

520. (1½/3)**d** *Seminar in Deviance and Social Control.*

525. (1½/3)**c** *Tutorial in Deviance and Social Control.*—Prerequisite: Sociology 520.

530. (1½/3)**d** *Seminar in Social Change and Development.*

535. (1½/3)**c** *Tutorial in Social Change and Development.*—Prerequisite: Sociology 530.

540. (1½/3)**d** *Seminar in Social Inequality.*

545. (1½/3)**c** *Tutorial in Social Inequality.*—Prerequisite: Sociology 540.

549. (3/6)**c** *Master's Thesis.*

550. (1½/3)**d** *Seminar in Social Interaction.*

555. (1½/3)**c** *Tutorial in Social Interaction.*—Prerequisite: Sociology 550.

560. (1½/3)**d** *Seminar in the Sociology of Knowledge.*

565. (1½/3)**c** *Tutorial in the Sociology of Knowledge.*—Prerequisite: Sociology 560.

570. (1½/3)**d** *Seminar in Work and Industry.*

575. (1½/3)**c** *Tutorial in Work and Industry.*—Prerequisite: Sociology 570.

580. (1½/3)**d** *Seminar in Canadian Society.*

585. (1½/3)**c** *Tutorial in Canadian Society.*—Prerequisite: Sociology 580.

590. (1½/3)**d** *Seminar in an Ethnographic Area.*

595. (1½/3)**c** *Tutorial in an Ethnographic Area.*—Prerequisite: Sociology 590.

598. (1½/3)**c** *Directed Study for Master's Students.*

599. (3) *Proseminar in Sociology.*

649. *Ph.D. Thesis.*

Soil Science (Faculty of Agricultural Sciences)

Note: Admission to undergraduate courses numbered 303 or higher requires previous credit for Soil Science 200 or consent of instructor.

200. (1½) *An Introduction to the Study of Soils.*—Physical, chemical and biological properties of soils; soil formation, classification, use and conservation. Course repeated in Spring term. [3-2; 0-0] or [0-0; 3-2]

214. (1½) *Forest and Agricultural Climatology.*—An introduction to the basic principles and processes of climatology. Energy and water balance concepts. Atmospheric motion. Microclimate of soils, crops, forests and animals. Microclimate modification and air pollution. Climate classification and land capability. Same as Geography 214. [3-2-0; 0-0-0]

300. (1½) *Soil in Man's Environment.*—Soil as an element of the environment and as a natural resource. The constitution, properties and classification of soils in relation to resource utilization and management. This course is intended primarily for students in faculties other than Agricultural Sciences and Forestry and credit will be given only for one of Soil Science 200 or 300. [3-0-2; 0-0-0]

301. (1½) *Soils in Natural Resource Management.*—The suitability and use of soils for different objectives including agriculture, forestry, engineering, urban development and recreation. Soils in relation to environmental quality. Recent developments in soil resource allocation and utilization, such as the Canada Land Inventory, Land Commission and zoning. The course is intended primarily for students in faculties other than Agricultural Sciences and Forestry. Prerequisite: Soil Science 300. [0-0-0; 3-0-2]

302. (1½) *Air Photo and Soil Interpretation for Forestry.*—Terrain analysis using aerial photographs: forest soil interpretations based on field observations and laboratory data. For application in forest resource management. This course is not intended for students specializing in forest soils, remote sensing, or land classification. Prerequisites: Soil Science 200, 214 (Geography 214). Credit will not be given for both Soil Science 302 and for Soil Science 303 (Forestry 312) or Soil Science 442 (Forestry 442). [3-2; 0-0)]

303. (1½) *Forest Soils.*—Forest soil properties, processes, and fertility; forest soils in relation to resource management. (Also offered as Forestry 312.) [0-0; 3-2]

308. (1½) *Quaternary and Applied Geomorphology.*—Landscape development during Quaternary era, emphasizing the history of glaciations with special reference to western North America; applications of geomorphological information in resource development and land management, emphasizing interpretation of Quaternary materials. Students will be required to attend weekend field trips. Prerequisites: Soil Science 200; and Geography 213 or Geology 351, or permission of Head of Department. (Same as Geography 308.) [3-1; 0-0]

311. (1½) *Microbial Ecology.*—Microbial diversity; ecological significance of metabolic diversity and structural adaptations. Interactions among microbial populations; microbial interactions with plants, animals. The effects of microbial activities in nature. Prerequisite: Microbiology 200 or 417, and Biology 201. (This course is the same as Biology 422). [0-0-0; 2-2-1]

315. (1½) *Soil Fertility.*—Principles underlying soil management practices including nutrient supply, fertilizers and soil amendments; experimental methods and soil analysis. [0-0; 3-2]

321. (1½) *Soil Biology.*—Soil organisms in virgin, forested, agricultural, and reclaimed ecosystems; role in primary production, nutrient cycling, decomposition; interactions with biological, physical and chemical environments. Prerequisite: Microbiology 200. [0-0; 2-3]

333. (1½) *Soil and Water Conservation.*—Emphasis is on a description of the physical processes fundamental to the management of agricultural and forest soil systems for sustained yield. Topics include soil erosion by wind and water, water conservation in arid areas, soil and water pollution, soil reclamation, conservation techniques and policies. [3-2; 0-0]

404. (1½) *Chemical Properties of Soils.*—Principles of soil colloid and solution chemistry; nature and laboratory characterization of soil minerals and organic matter. Chemical aspects of natural processes in the soil and reactions with soil environmental contaminants. Prerequisites: Chemistry 205 or 208 and consent of instructor. [3-2; 0-0]

413. (1½) *Physical Behaviour of Soils.*—A study of the physical behaviour of soils as related to their use, with emphasis on water movement and retention. Laboratory exercises in methods used to investigate physical properties and behaviour of soils. [3-2; 0-0]

414. (1½) *Biometeorology.*—The physical processes determining the microclimate of soils, forests and agricultural crops. Topics include radiation, heat and water relations, diffusion and turbulent exchange of matter and the modification of the microclimate. Instrumentation and field measurement. [0-0; 3-2]

416. (1½) *Identification, Classification and Geography of Soils.*—Soil formation, the soil as a natural body, principles of identification, classification, appraisal and cartography of geographic units, nature and distribution of major kinds of soils. [0-0; 3-2]

417. (1½) *Land Classification:* Methods of data collection, analyses and classification of land for multiple uses.—This course is the same as Forestry 422. Prerequisite: Forestry 442. [0-0-0; 2-0-2]

418. (1½) *Field Methods in Soil Science.*—Quantitative sampling, soil description and mapping; field measurement of soil biological, chemical and physical properties; applications to agriculture and forestry. Field trips will be required. Prerequisite: Consent of the Department Head. [1-3; 0-0]

419. (1½) *Field Project in Soil Science.*—An approved field project under the supervision of a faculty member, supported by an essay relative to the field project. Normally taken between third and fourth year. Prerequisite: Consent of the instructor.

423. (1) *Undergraduate Seminar.*

430. (1-3)**c** *Directed Studies.*—Systematic work on approved problem.

442. (1½) *Photo Interpretation Forest Lands.*—Landform identification and terrain analysis from air photographs, application to forest and agricultural land mapping. This course is the same as Forestry 442. [2-0-2; 0-0-0]

443. (1½) *Remote Sensing in Forestry and Agriculture.*—Basic biological concepts related to interpretation of remote sensing data for land management, including the use of films and filters, and interpretation of air photographs and other imagery. This course is the same as Forestry 443. [2-0-2; 0-0-0]

498. (1½) *Undergraduate Essay.*—Preparation of a comprehensive and analytical review of an approved topic under the supervision of a faculty member. Prerequisite: Approval of the Head of Department. Consult before the end of classes in third year.

499. (3) *Undergraduate Thesis.*—Design and execution of an experimental/analytical research project leading to preparation of a thesis. Prerequisite: Approval of the Head of Department. Consult before the end of classes in third year.

500. (1) *Graduate Seminar.*

501. (1) *Seminar in Soil Physics, Biometeorology, and Hydrology.*—Current research in agricultural and forest hydrology. Emphasis is placed on graduate student research problems.

502. (1) *Seminar in Soil Chemistry and Soil Fertility.*

503. (3) *Forest Soils and Tree Nutrition.*—Advanced studies of soils in relation to tree nutrition and forestry. Prerequisite: Soil Science 303.

504. (1½/3)**c** *Advanced Soil Chemistry.*—A study of research findings in specific phases of Soil Chemistry. (Offered in alternate years.)

512. (1½/3)**c** *Advanced Soil Biology.*—Root-soil interfaces; rhizosphere, mycorrhizae, nodulation; predation and grazing by soil fauna. Prerequisite: Soil Science 321.

513. (3) *Soil Physics.*—Thermodynamics of soil water. Soil hydrology, with emphasis on the hydrologic behaviour of heterogeneous and anisotropic soils.

514. (1½/3)**c** *Biometeorology.*—Energy and mass exchange in the biosphere with emphasis on the interfaces between the atmosphere and soils, plants and animals. (Offered in alternate years).

515. (1½/3)**c** *Topics in Soil Fertility.*—Discussions on special topics in soil fertility with emphasis on soil factors influencing nutrient availability and uptake. (Offered in alternate years.)

516. (1½/3)**c** *Soil Genesis and Classification.*—Principles of soil classification; reactions and processes of soil genesis; development of major soil groups of the world. Saturday field trips required. Prerequisites: Soil Science 416 and consent of instructor. (Offered in alternate years.)

517. (1½/3)**c** *Soil and Land Evaluation.*—Methods and concepts used for multi-purpose soil and land evaluation. Evaluation is placed on quantitative capability and suitability assessments using integrated soils and terrain data banks. Prerequisite: Soil Science 417 or Forestry 422 or consent of instructor.

518. (1½/3)**c** *Colloidal Properties in Soil.*—A study of the common minerals and colloids found in sediments and soils, their reactions, properties, weathering and diagenetic characteristics, and methods used for identification and characterization. (Offered in alternate years.) [3-2; 3-0] or [3-2; 3-2]

524. (1) *Instrumentation for Biometeorology.*—The theory, design and evaluation of instrumentation for biometeorological research. Consent of instructor.

525. (1) *Techniques and Methods of Soil Chemistry and Fertility Research.*

530. (1-3)**c** *Directed Studies.*

533. (1½/3)**c** *Physical Processes in Soil and Water Conservation.*—The effects of tillage and mulching on soil thermal and moisture regimes. The control of soil degradation in agriculture and forestry.

549. (6) *Master's Thesis.*

649. *Ph.D. Thesis.*

Spanish and Portuguese (Department of Hispanic and Italian Studies, Faculty of Arts)

100. (3) *Beginners' Spanish.*—Grammar, composition, translation, oral practice. [4-0; 4-0]

102. (3) *First-Year Portuguese.*—Grammar, composition, translation, oral practice. [3-1; 3-1]

105. (6) *Intensive Spanish.*—An accelerated course. Grammar, reading, composition, with special emphasis on the spoken language. This course is equivalent to Spanish 100 and 200. [6-0; 6-0]

110. (3) *First-Year Spanish.*—Grammar, composition, translation, oral practice, readings. Prerequisite: C or P in Spanish 11 or Pass-standing in Spanish 100. This course completes the Language Requirement for the Faculty of Arts. [4-0; 4-0]

200. (3) *Second-Year Spanish.*—Grammar, composition, translation, oral practice, readings. Prerequisite: A or B in Spanish 11 or first- or second-class standing in Spanish 100. [3-1; 3-1]

202. (3) *Second-Year Portuguese.*—Grammar, composition, translation, oral practice, readings. Prerequisite: Portuguese 102 or equivalent. [3-1; 3-1]

205. (3) *Intermediate Spanish.*—Conversation, translation and readings. Prerequisite: Spanish 12, or Spanish 110. Students with first or second class standing in Spanish 100 may take this course concurrently with Spanish 200. [3-0; 3-0]

211. (3) *Introduction to Hispanic Civilization.*—History and culture of the Hispanic world. Elements of Hispanic Civilizations and Languages. Their transmission to the New World. The emergence of independent Hispanic societies. The physical, social and intellectual conditions of the Hispanic countries in the contemporary era. In English. Recommended for all major and honours students but open to any students. [3-0; 3-0]

220. (3) *Introduction to Hispanic Literature.*—Basic techniques of literary analysis through the study of selected texts from the literatures of Spain and Spanish America. Prerequisite for the Major or Honours program. [3-0; 3-0]

300. (3) *Spanish Language.*—Composition, translation, and oral practice. The course will place special emphasis on pronunciation and syntax. [3-0; 3-0]

305. (3) *Spanish Language.*—Intensive grammar study, reading, translation and commenting on literary texts, for senior students with no previous knowledge of Spanish. Prerequisite: proficiency in another Romance language or Latin. [3-1; 3-1]

307. (3) *Introduction to Portuguese for Senior Students.*—Intensive grammar study, translation and reading of literary texts for senior students with no previous knowledge of Portuguese. Prerequisite: proficiency in another Romance language or Latin. [3-1; 3-1]

311. (3) *Spanish Literature in Translation.*—Introduction for the non-specialist to the major works, authors and literary movements of Spain from the Middle Ages to the present. This course does not count for credit towards a major or honours program in Spanish. [3-0; 3-0]

312. (3) *Latin-American Literature in Translation.*—Introduction for the non-specialist to the major contemporary Latin-American literary works and their cultural background. This course does not count for credit towards a major or honours program in Spanish. [3-0; 3-0]

335. (3) *Survey of Spanish Literature from its origins to 1700.* [3-0; 3-0]

349. (1½) *Seminar for Major and Honours Students.* [0-1; 0-2]

355. (3) *Survey of Spanish Literature from 1700 to the present.* [3-0; 3-0]

363. (3) *Survey of Spanish-American Literature.* [3-0; 3-0]

392. (1½/3)**d** *Studies in Portuguese and Brazilian Literature.* [3-0; 3-0]

400. (3) *Advanced Studies in Spanish Language and Style.*—Intensive training in translation and free composition, with special emphasis on the stylistic analysis of literary texts. [3-0; 3-0]

403. (3) *History of the Spanish Language.*—The origins and development of Spanish; study of representative texts. The course will include an introduction to the history of Portuguese. [3-0; 3-0]

407. (1½/3)**d** *Special aspects of the Peninsular and Latin American Linguistic areas.*—A brief introduction to some problems of Dialectology and/or to other Romance languages spoken in the Hispanic world. [3-0] or [3-0; 3-0]

427. (1½/3)**d** *Selected topics in Medieval Literature.*—Study of Medieval literature through the analysis of representative texts and authors. [2-1] or [2-1; 2-1]

436. (1½/3)**d** *Cervantes and his Age.*—The writer and the background of his work and thought. [3-0] or [3-0; 3-0]

437. (1½/3)**d** *The Golden Age.*—Sixteenth- and seventeenth-century literature approached through the study of a genre: theatre, novel, poetry. [2-1] or [2-1; 2-1]

438. (1½/3)**d** *Selected Authors of the Golden Age.*—Study of the period through the analysis of representative authors' works. [2-1] or [2-1; 2-1]

444. (1½/3)**d** *Hispanic Language and Literature.*—Selected topics. [3-0] or [3-0; 3-0]

449. (3/6)**c** *Honours Essay.*

457. (1½/3)**d** *Studies in Spanish Literary Genres from 1700 to the Present.*—Theatre, novel, poetry, essay. [2-1] or [2-1; 2-1]

458. (1½/3)**d** *Selected Topics of the Eighteenth, Nineteenth and Twentieth centuries in Spain.*—Literary periods and movements or individual authors. [2-1] or [2-1; 2-1]

464. (1½/3)**d** *Studies in Latin-American Literature.* [2-1] or [2-1; 2-1]

467. (1½/3)**d** *Studies in Spanish-American Literary Genres.*—Theatre, novel, poetry, essay, short story. [2-1] or [2-1; 2-1]

468. (1½/3)**d** *Selected topics in Spanish-American Literature.*—Literary periods and movements or individual authors. [2-1] or [2-1; 2-1]

501-502. (1½/3)**d** *Studies in Hispanic Languages.*

520-521. (1½/3)**d** *Selected Topics in Medieval Spanish Literature.*

529-530. (1½/3)**d** *The Renaissance.*

535-537. (1½/3)**d** *Studies in the Literature of the Golden Age.*

541. (1½) *Bibliography and Research Methods.*

542. (1½) *Studies in Literary Criticism.*

543. (1½/3)**d** *General Studies in Hispanic Culture and Literature.*

544. (1½/3)**d** *The Regional Literatures of Spain.*

549. (3/6)**c** *Master's Thesis.*

550-551. (1½/3)**d** *Studies in Eighteenth-Century Literature.*

553-554. (1½/3)**d** *Selected Topics in Nineteenth-Century Literature.*

556-557. (1½/3)**d** *Selected Topics in Twentieth-Century Literature.*

560-561. (1½/3)**d** *Studies in Spanish American Literature.*

591. (1½/3)**d** *Studies in Luso-Brazilian Literature.*

649. *Ph.D. Thesis.*

Special Education (Faculty of Education)

312. (1½) *Introduction to the Study of Exceptional Children.*—An examination of all groups of exceptional children in terms of definition, incidence, characteristics, diagnosis and treatment. (Prerequisite to most other courses in Special Education. Can be taken concurrently with several other introductory courses in Special Education.) [3-0; or 3-0]

313. (1½) *Introduction to Teaching the Gifted and Creative.*—This course is designed to help the teacher understand gifted and creative students and their special needs. Emphasis is placed on the identification, appraisal, principles and desirable conditions relating to the education of the gifted and creative student. [3-0; 0-0]

314. (1½) *Introduction to the Education of the Visually Impaired.*—An introductory course reviewing the identification and education of blind and partially-sighted children. Designed to aid teachers to accommodate visually impaired children in the regular class setting. Pre- or co-requisite: Special Education 312. [3-0; 0-0]

315. (1½) *Introduction to the Acquisition of Language in Exceptional Children.*—The course deals with severe language disabilities in children. Emphasis is placed on theories of language acquisition as applied to the assessment of severe language disorders in children. Pre- or co-requisite: Special Education 312. [3-0; 0-0]

316. (1½) *Specific Learning Disabilities.*—An introduction to the identification and assessment of basic motor, perceptual, and other disabilities in children. The course is directed toward children who have no readily-apparent learning disability but who are still not learning in school. Pre- or co-requisite: Special Education 312. [3-0; 0-0]

317. (1½) *The Exceptional Child in the Regular Classroom.*—A study of the learning and behavioural conditions that accompany a wide range of handicapped or gifted children. The emphasis is on accommodating the exceptional child in the regular class through an understanding of his needs and a knowledge of resources. [3-0; 0-0] or [0-0; 3-0]

318. (1½) *Education of the Handicapped Adolescent.*—A study of the physical, psychological and sociological characteristics of handicapped adolescents and the implications of these characteristics for program development and implementation. Pre- or co-requisite: Special Education 312. [0-0; 3-0]

319. (1½) *Remedial Speech for Students with Hearing Impairments.*—Diagnosis, programming and evaluation of children suffering from speech disorders and hearing impairments. Laboratory requirements include observation and practical experience. Corequisites: Special Education 422 and 445. [3-0; 0-0] or [0-0; 3-0]

320. (1½) *Teaching Concepts to Visually Handicapped Children.*—Academic readiness and mastery of academic subjects by blind and other visually handicapped children. Special curricula and methodologies designed to compensate for deficits in spatial and other visually based concepts. Development and application of curriculum materials in classroom settings in conjunction with teaching practica. (This course is restricted to students enrolled in the Diploma Program in Education of Visually Impaired Children or those who hold the Diploma or its equivalent.) Pre- or co-requisite: Mathematics Education 369. [3-0; 3-0]

342. (1½) *Field Experiences with Individual Atypical Children.*—Experience in working with several atypical children on an individual basis for a term under the supervision of faculty and educational personnel in a community setting. Diagnosing needs, planning programs and integrating instruction and materials on an individual basis. (For degree and diploma programs in Special Education.) [1-9]

343. (1½) *Materials in Special Education: Developing Perspectives.*—Focuses on the critical examination of published materials for use with exceptional children. Students will be expected to investigate, analyse and adapt materials to suit special educational circumstances. [3-1]

344. (1½) *Programming in Special Education: Developing Perspectives.*—An examination of the range of educational methodologies and teaching procedures and a discussion of their implications for the establishment of programs useful in working with exceptional children. The course comprises a practical examination and a detailed comparison of the major special educational methodologies. [3-1]

345. (1½) *A Critical Review of Research in Special Education.*—Designed to assist the special education teacher in the process of critically reviewing current research literature in the areas of mental retardation, learning disabilities and behavioural disorders as well as other areas of individual interest in special education. [3-1]

346. (1½) *Academic Curricula in Special Education: Developing Perspectives.*—Based on a practical examination of curricula used in special education focussing on both long and short term goals. Provisions will be made to accommodate a student's special interest area in the study of exceptional children. [3-1]

347. (1½) *Field Experiences with Groups of Atypical Children.*—An intensive experience in working with groups of handicapped children for a term under the supervision of faculty and educational personnel in a community setting. [1-9]

348. (1½) *Working with Parents of Handicapped Children.*—The needs and problems of a family with a handicapped child; the role of the parents in the education of their handicapped child; the role of the teacher in relation to parents and other professionals; services provided for parents: parents' organizations and associations. [3-1]

390. (1½) *Selected Topics in Special Education.*—A study of innovative practices, ideas, and theories in special education. The specific topics may change yearly to reflect changing priorities and interests in special education, and the specific interest and competencies of visiting and regular faculty in special education. Prerequisite: Special Education 312 and consent of the instructor. [3-0; 0-0] or [0-0; 3-0]

403. (1½) *Mental Retardation.*—Characteristics of mentally retarded children; classification; overview of medical, legal, educational, and social provisions for the mentally retarded. Pre- or co-requisite: Special Education 312. [3-0; 0-0]

406. (1½) *Education of Atypical Infants and Children.*—The effects of handicapping conditions upon the normal processes of growth and development are studied; principles and practices of early intervention, parent involvement and parent education will be examined. Pre- or co-requisite: Special Education 312. [0-0; 3-0]

408. (1½) *Programming for the Gifted and Creative.*—Planning suitable educational programs at both elementary and secondary levels for gifted and creative students. Prerequisite: Special Education 313. [0-0; 3-0]

415. (1½) *Optacon Reading for Teachers of the Visually Impaired.*—Aims to prepare teachers of the visually impaired to teach blind students to become independent readers with the Optacon, and other electronic reading devices as they are developed. Field experience in research and teaching of the Optacon is included. Pre- or co-requisite: Special Education 421. [2-2; 0-0] or [0-0; 2-2]

418. (1½) *Career and Alternative Educational Programs for the Handicapped.*—A review of programs at the secondary and post-secondary level which develop the vocational, social and personal adequacy of the handicapped adolescent and adult. Prerequisite: Special Education 318. [0-0; 3-0]

419. (1½) *Introduction to Speech and Communication Disorders in Children.*—A survey for the classroom teacher of the natural development of speech and language as a basis for recognizing and understanding deviations from the normal. Pre- or co-requisite: Special Education 312. [3-0; 0-0]

420. (1½) *Education of the Moderately Intellectually Impaired.*—An examination of techniques for identifying and educating moderately retarded (TMR) children. Pre- or co-requisite: Special Education 403. [0-0; 3-0]

421. (3) *Provisions in the Education of the Visually Handicapped.*—Provisions, procedures and methodology in the teaching of specific curriculum for the blind and visually impaired. Life skills and adjustment to blindness. (Available only to full-time students in the Diploma Program in Education of Visually Impaired Children.) [3-0; 3-0]

422. (1½) *Phonetics and Voice Science.*—An introduction to the phonetic alphabet designed to give the classroom teacher a practical knowledge of the alphabet of sound, the mechanisms used in the production and articulation of speech sounds, and their application to the speech problems of children. [3-0; 0-0] or [0-0; 3-0]

423. (1½) *Principles of Teaching the Hearing Impaired.*—An introductory course reviewing methods of teaching, administration, and organization of the education program for the hearing impaired. Pre- or co-requisite: Special Education 312. [3-0; 0-0]

424. (1½) *The Stimulation of Language Development in Exceptional Children.*—The course is designed to acquaint teachers with the variety of approaches, programs, and methods for the remediation of severe language disorders in children. Prerequisite: Special Education 315. [0-0; 3-0]

429. (1½) *Education of the Mildly Intellectually Impaired.*—An examination of techniques for identifying and educating mildly retarded (E.M.R.) children. Pre- or co-requisite: Special Education 312. [3-0; 0-0] or [0-0; 3-0]

431. (1½) *Programming for Children with Specific Learning Disabilities.*—Methods and programs for learning disabilities are reviewed. Practical experience in the development and execution of a remedial program is required. Prerequisite: Special Education 316. [0-0; 3-0]

436. (1½) *Behaviour Disorders in Children.*—An introductory course dealing with identification, classification, and aetiology of emotional disturbance and social maladjustment in children. Pre- or co-requisite: Special Education 312. [3-0; 0-0]

437. (1½) *Teaching Maladjusted Children.*—An examination of techniques for educating maladjusted children in public school, residential schools, and day hospital programs. Pre- or co-requisite: Special Education 312. [0-0; 3-0] or [3-0; 0-0]

441.* (1½) *Audiology I.*—Physics of sound; anatomy of the ear; physiology of hearing; pathology and aetiology of hearing impairment. [3-0; 3-0]

442.* (1½) *Audiology II.*—Measurement of hearing; hearing aids and audiology training. Prerequisite: Audiology I. [3-0; 3-0]

443.* (1½) *Teaching Communication Skills to the Hearing Impaired.*—Receptive and expressive language; speech reading; manual communication systems. [3-0; 3-0]

444.* (1½) *Teaching Academic Subjects to the Deaf.*—Organization and modification of curriculum. [3-0; 3-0]

445.* (1½) *Teaching Speech to the Deaf.*—Methods of teaching speech; practicum. [3-0; 3-0]

446.* (1½) *History of Education of the Deaf.*—Historical survey of methods and practices in education of the deaf. [3-0; 3-0]

447.* (1½) *Psychology of Deafness.*—Theoretical and experimental studies of the effects of deafness upon development; adaptation and use of psychological tests with the deaf. [3-0; 3-0]

*These courses are available only to full-time students in the Diploma Program for Education of the Deaf.

448. (1½) *The Education of Children with Multiple Handicaps.*—The course is an exploration of methods of assessment and teaching approaches that meet the educational needs of children who combine sensory with motor and/or neurological impairments. Co-requisite: Special Education 312. [0-0; 3-0]

455. (1½) *Introduction to Orientation and Mobility for the Blind.*—Aims to acquaint teachers with an understanding of the process of teaching independent travel to blind students and assist teachers to incorporate orientation and mobility skills in school. Pre- or co-requisite: Industrial Education 421. [2-2; 0-0] or [0-0; 2-2]

507. (1½) *History of Special Education.*—A historical review of programs in special education in Europe and North America. Prerequisites: Special Education 312.

508. (1½-6)**c** *Review of Research in Educational Methods.*—Studies are made of recent research bearing on educational practice. Prerequisite: Appropriate senior undergraduate introductory or methods course.

509. (1½) *Organization of Special Education.*—Detailed review of contemporary special education services; organization and planning of programs; teacher education. Prerequisite: Special Education 312.

512. (1½) *Problems and Issues in Special Education.*—An advanced seminar to examine selected trends, divergent perspectives and controversies in the field of special education. Prerequisite: At least 12 units of special education courses.

513. (1½) *Seminar in Mental Retardation.*—Review of recent educational, psychological, and medical research in the field of mental retardation. Prerequisite: Special Education 420 or 429.

515. (1½) *Seminar on the Education of Children with Behaviour Disorders.*—An advanced course in the area of behaviour disorders. Applied experience will be related to critical evaluation of theory and research in behaviour disorders. The course stresses research findings related to the education of children with behaviour disorders. Students registered in this course will already be familiar with basic theoretical positions and educational techniques with behaviourally disordered individuals. Prerequisites: Special Education 436 and 437.

516. (1½) *Seminar in the education of the creative and gifted learner.*

526. (1½) *Seminar in Specific Learning Disabilities.*—An advanced seminar on specific learning disabilities. The course stresses research findings in learning disabilities as they apply to description, diagnosis and programming. Students registered in this course arethodologies concerning learning disabled individuals. Field work in applied research will be a course requirement. Prerequisites: Special Education 431 and Educational Psychology 536 (Educational Psychology 535 is also recommended).

529. (1½) *Seminar in the Education of the Visually Handicapped.*—Review of educational and developmental research studies of visually handicapped children. Prerequisite: Special Education 314.

530. (1½) *Seminar in Education of the Hearing Impaired.*—Review of recent educational psychological and audiological research and intervention techniques in the field of hearing impairment. Prerequisite: Special Education 423.

533. (1½) *Psychology of Handicapped Children.*—Physical, mental, social, and emotional characteristics of handicapped children (backward, crippled, hard-of-hearing, etc.). Prerequisite: Special Education 312.

537. (1½) *The Education of Multi-handicapped Children.*—Research and current practice in the education of children with multiple disabilities. Prerequisites: Special Education 448, 513 (may be concurrent) and 568.

561. (1½-6)**c** *Laboratory Practicum.*

565. (1½/3)**d** *Special Course in Subject Matter Field.*—Courses in various subject matter fields designed to bring teachers up to date in recent findings in each field.

568. (1½) *Special Education of the Orthopaedically and Neurologically Handicapped.*—For specialists in the education of the crippled, hospitalized, spastic, and those with similar handicaps. Recent research in methods of instruction. Prerequisite: Education 431.

573. (1½) *Advanced Seminar in Research on Exceptional Children.*—Review of research related to special education and its application to the field. Normally taken late in the student's program.

580. (1½-6)**c** *Problems in Education.*—Investigation and report of a problem.

598. (1½-6)**c** *Field Experiences.*—For those on Master's, Doctoral and Diploma Programs.

599. (3/6)**c** *Master's Thesis.*

601. (3/6)**c** *Doctoral Seminar.*

699. *Doctoral Thesis.*

Statistics (Faculty of Science)

** For students in the Faculty of Applied Science.*

105. (1½) *Descriptive and Elementary Inferential Statistics.*—An introduction to statistical reasoning. Deriving information from data using descriptive statistics and graphical methods. Sampling distributions. Elementary probability models. The process of inductive inference. Topics are presented in terms of real data from familiar contexts. Prerequisite: Mathematics 100 or 120. [3-1; 0-0] or [0-0; 3-1]

200. (1½) *Statistics for Applications.*—Classical, nonparametric and robust techniques for inferences about means, variances, and models for categorical data, regression and analysis of variance. Emphasis will be on problem formulation, models and assumptions, and interpretation. Credit will be given for only one of Statistics 105, 200 and 203. Prerequisite: Mathematics 101. [3-0; 0-0] or [0-0; 3-0]

203. (1½) *Statistical Methods I.*—Organizing, displaying and summarizing data. Inductive inference based on elementary probability models including estimation and hypothesis testing. Faculty of Science credit will not be given. Credit will be given for only one of Statistics 203 and Statistics 105. Students who have taken Mathematics 100 are advised to take Statistics 105 rather than Statistics 203. Prerequisite: Mathematics 11. [3-0; 0-0]

205. (1½) *Probability and Statistics I.*—Probability, conditional probability, random variables, discrete and continuous probability distributions, expectation, bivariate distributions, law of large numbers, and central limit theorem. Prerequisite: Mathematics 101. Mathematics 205 and Statistics 205 are the same. [3-0; 0-0] or [0-0; 3-0]

*251. (1½) *Elementary Statistics.*—Probability, discrete and continuous random variables, joint probability distributions, point and interval estimation, hypothesis testing, additional topics from regression, analysis of variance, goodness of fit. Prerequisite: Mathematics 200 or 253. [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

302. (1½) *Introduction to Probability.*—Basic notions of probability, random variables, expectation and conditional expectation, limit theorems. Prerequisites: Mathematics 200 or 225 (which may be taken concurrently if Statistics 302 is being taken in the second term). Mathematics 302 and Statistics 302 are the same. Credit will not be given for both Mathematics/Statistics 205 and Mathematics/Statistics 302. [3-0; 0-0] or [0-0; 3-0]

303. (1½) *Statistical Methods II.*—A continuation of Statistics 203 consisting of elementary probability models, one and two sample tests, simple and multiple regression, analysis of variance, methods for discrete data analysis and nonparametric methods. The use of statistical computer packages will be integrated into the course. Faculty of Science credit will not be given. Prerequisite: Statistics 105 or 203. [3-0; 0-0] or [0-0; 3-0]

304. (1½) *Elementary Decision Theory.*—The mathematical principles of decision-making using utility theory, subjective probabilities; data; Bayesian and classical methods. The requisite brief introduction to probability and statistics is given. Emphasis is on applications of general interest. The treatment of classical statistical problems from a decision theoretical point of view is described. Prerequisite: Mathematics 205 or Statistics 205. [3-0; 0-0] or [0-0; 3-0]

305. (1½) *Introduction to Statistical Inference.*—Review of probability theory. Sampling distributions. Theory, large sample theory and methods of estimation and hypothesis testing, including maximum likelihood estimation, likelihood ratio testing and confidence interval construction. Prerequisite: Mathematics/Statistics 302 or Mathematics 200 and Mathematics/Statistics 205. [3-0; 0-0] or [0-0; 3-0]

306. (1½) *Applied Regression Analysis.*—Theory and application of regression analysis including residual analysis, diagnostics, transformations, model selection and checking, weighted least squares and nonlinear models. Additional topics may include inverse, robust, ridge and logistic regression. Prerequisites: Mathematics 221 and Statistics 305. [0-0; 3-0]

308. (1½) *Introduction to Stochastic Processes.*—Theory and applications, including random walk, discrete-time Markov chains, Poisson processes, continuous-time Markov chains, revewal theory and additional topics. Credit will be given for only one of Mathematics 318 and Statistics 308. Prerequisites: Mathematics 200 and one of Statistics 205, Mathematics 205. Corequisite: Statistics 305. [3-0; 0-0] or [0-0; 3-0]

344. (1½) *Sample Surveys.*—Planning and practice of sample surveys. Random sampling, bias and variance, unequal probability sampling, systematic, multistage and stratified sampling, ratio and regression estimators, post-stratification, establishing a frame, pretesting, pilots, nonresponse, and additional topics. Prerequisites: Statistics 200 and Statistics/Mathematics 205. [3-0; 0-0] or [0-0; 3-0]

346. (1½) *Distribution Free and Robust Statistics.*—Techniques based on signs, counts, ranks and order statistics. Probability plots, permutation tests, rank tests, Hodges-Lehmann estimates, rank correlation, goodness-of-fit and independence, confidence and tolerance limits based on order statistics, additional topics. Prerequisites: Statistics 200 and 305. [3-0; 0-0] or [0-0; 3-0]

404. (1½) *Analysis of Variance.*—Theory and application of the analysis of variance for standard experimental designs. Single factor designs, fixed and random effects, block designs, hierarchical designs, multiple comparisons, Cochran's Theorem, factorial designs, mixed models, general rules for the analysis of balanced designs, analysis of covariance. Prerequisite: Statistics 306. [3-0; 0-0]

405. (1½) *Design of Experiments.*—Construction and analysis of experimental designs, 2^k and 3^k factorial designs, confounding, fractional replication, split-plot type designs, incomplete block designs, response surface designs, optimal design theory, special topics. Prerequisite: Statistics 404. [0-0; 3-0]

406. (3) *Statistical Inference.*—A detailed theoretical development. Likelihood, Bayes, minimax and conditional inference. Statistical models, exponential families, sufficiency, completeness, properties of estimators, optimal tests and confidence intervals, elements of decision theory, additional topics. Intended for Honours students. Prerequisite: Mathematics 320 or permission of the Head. Statistics 305 strongly recommended. [3-0; 3-0]

441. (1½) *Multivariate Statistical Methods.*—Extensions of methods of estimation, testing hypotheses, analysis of variance and regression to multivariate data. Introduction to the exploratory and descriptive use of canonical correlations, principal components, factor analysis, discrimination and classification techniques, and cluster analysis. Emphasis will be on computer implementation and applications to the various sciences. Prerequisite: Statistics 404. [0-0; 3-0]

442. (1½) *Statistical Methods for Categorical Data.*—Exact and asymptotic methods for 2x2 and rxc contingency tables, logistic regression models for binary response variables, log-linear models for multiway contingency tables, model selection, special topics. Emphasis will be on computer implementation, application in various sciences, and interpretation of the various models. Prerequisite: Statistics 306. [3-0; 0-0] or [0-0; 3-0]

445. (1½) *Introduction to Exploratory Data Analysis.*—Methods for exploring and presenting the structure of data: one group of numbers, several groups, bivariate data, time series data and two-way tables. Data displays, outlier identification, transformations, resistant regression, several types of data smoothing, comparisons with standard statistical methods. Prerequisite: Statistics 306. [3-0; 0-0] or [0-0; 3-0]

447. (1-3)c *Special Topics in Statistics.*—Students should consult the Statistics Department for the particular topics offered in a given year. Prerequisite: Statistics 305, and permission of the instructor.

519. (3) *Theoretical Statistics.*—Designed to prepare the student for specialized studies and research. Statistical decision problems, optimal decision rules, admissibility and completeness, Bayes and minimax procedures, characterization of sufficiency, structure of exponential families, unbiased and invariant estimators, most powerful tests, symmetry and invariance, asymptotic theory, special topics. Prerequisites: Mathematics 418, 420 and Statistics 406.

520. (1½) *Statistical Decision Theory.*—Basic concepts, statistical games and the minimax theorem, complete class theorems, the principle of variance, multiparameter estimation and James-Stein theory. Prerequisite: Statistics 519.

521. (1½) *Foundations of Multivariate Analysis.*—Multivariate normal distribution theory and parameter estimation, multivariate linear models, transformations and invariant measures, the role of invariance, the Wishart distribution, canonical correlations, zonal polynomials. Prerequisite: Statistics 519.

522. (1½) *Asymptotic Theory and Conditional Inference.*—Sufficiency and ancillarity, likelihood principle, conditionality principle, curved exponential families, higher order asymptotics, Edgeworth and saddlepoint approximations, local ancillarity. Prerequisite: Statistics 519.

530. (1½) *Bayesian Inference and Decision.*—Utility functions and subjective probability distributions, uninformative priors, inference for common models such as the multivariate normal and regression models, hierarchical prior models, intersubjective statistical decision theory. Prerequisite: Statistics 406.

531. (1½) *Reliability Theory.*—Probabilistic aspects of reliability theory. Classes of life distributions based on notions of ageing, coherent systems, shock models, notions of dependence, multivariate distributions for dependent components, maintenance and replacement models. Prerequisites: Statistics 305, 308 and Mathematics 320.

532. (1½) *Sequential Statistical Procedures.*—Sequential probability ratio test, fundamental identity, operating characteristics, optimality. Sequential tests for composite hypotheses. Sequential design of experiments. Bayes sequential decision problems, numerical methods. Applications to statistical problems. Prerequisites: Mathematics 418 and Statistics 406.

533. (1½) *Survival Analysis.*—Basic concepts, special distributions, censoring. Parametric and nonparametric methods, product-limit estimator, log-rank test, goodness-of-fit. Models for dependence on explanatory variables, residual analysis, time dependent covariates. Prerequisites: Statistics 306 and 406.

541. (1½) *Applied Multivariate Analysis.*—Topics to be developed with motivation provided by examples from various sciences include: multivariate normal distribution, assessing multivariate normality, Hotelling's T^2, multivariate analysis of variance and covariance, multivariate regression, discrimination and classification, cluster analysis, canonical correlation, principal components, and factor analysis. Prerequisites: Mathematics 307 and Statistics 404. Corequisite: Statistics 406.

542. (1½) *Analysis of Categorical Data.*—A systematic treatment of the theory and use of log-linear and linear logistic models for categorical response variables. Poisson, multinomial and product-multinomial sampling models, maximum likelihood estimation, existence of direct estimates, computational algorithms, adjusted residuals, asymptotic inference, approaches to model selection, special topics. Prerequisite: Statistics 404. Corequisite: Statistics 406.

543. (1½) *Time Series Analysis.*—A systematic treatment of many of the techniques of the analysis of time series data. Topics include time dependence and randomness, trend, seasonality and error, stationarity, finite parameter models, Box-Jenkins techniques, spectral analysis, the Wiener-Kolmogorov approach, multivariate time series, cross-spectral analysis, 'final form'-type models, and Kalman filtering. Prerequisite: Permission of instructor.

544. (1½) *Theory of Sampling.*—A comprehensive account of sampling theory as it has been developed for use in sample surveys. Topics include single random sampling, stratified random sampling, ratio estimates, regression estimates, systematic sampling, cluster sampling, subsampling, double sampling, estimation of sample size, sources of errors in surveys. Corequisite: Statistics 406.

545. (1½) *Data Analysis.*—Topics will include the philosophy of exploratory data analysis, indication and cross validation, displaying and summarizing data, residual plotting, transforming data, assessing uncertainty, the jacknife, multiway analysis, robustness, standardization, regression and curve fitting, the bootstrap and other computer-intensive methods. Prerequisite: Statistics 404. Corequisite: Statistics 406.

546. (1½) *Nonparametric Statistical Methods.*—Linear rank tests for one and two samples, sign test, rank sum test, normal scores test, Savage test. Rank tests for k samples and

nonparametric regression. Permutation tests. Goodness-of-fit tests, Kolmogorov-Smirnov and Cramer-von Mises tests. Power and efficiency of nonparametric methods. Nonparametric estimation. Theory of U-statistics. Prerequisite: Statistics 406.

547. (1-3)c *Topics in Statistics*.—Students should consult the Statistics Department for the particular advanced topics offered in a given year.

548. (1-3)c *Directed Studies in Statistics*.—Advanced study under the direction of a faculty member may be arranged in special situations.

549. (3/6)c *Thesis for Master's Degree*.

649. *Ph.D. Thesis*.

Surgery (Faculty of Medicine)

***Note:** Credit will not be given for both 502 and 782, 504 and 784, 505 and 785, 548 and 788.

410. (1) *Primary Care of the Emergency Patient*.—A 24-hour elective course to be given in the second term of first year. The principles of First Aid management of the emergency patient will be covered in a lecture course given in conjunction with practical demonstrations in which the student will participate. Not offered 1986-87. [0-0; 2-0]

425. *Introduction to Surgery*.—A series of lectures designed to illustrate the basic surgical principles. Bedside clinics illustrating the principles of physical diagnosis are given in cooperation with the Department of Medicine. Students are given the opportunity to examine patients. Textbooks: Dunphy and Way, Current Surgical diagnosis and treatment. Hamilton Bailey, Physical Signs in Clinical Surgery; Dunphy and Botsford, Physical Examination of the Surgical Patient. American Orthopaedic Association: Manual of Orthopaedic Surgery. Second term.

450. *Principles of Surgery*.—Lectures and demonstrations in all aspects of surgery are given in conjunction with the other clinical departments as part of the "systems" lectures in third year. Clinical teaching is provided by the divisions of surgery (General Surgery, Cardiothoracic Surgery, Neurosurgery, Otorhinolaryngology, Pediatric Surgery, Plastic Surgery, Radiation Oncology and Urology) and Department of Orthopaedics with strong emphasis on bedside teaching in small groups, and supervised instructions in case writing and presentation. Surgical diagnosis is emphasized rather than surgical techniques. The teaching facilities of the Vancouver General Hospital, St. Paul's Hospital, Shaughnessy Hospital, Children's Hospital, Health Sciences Centre Acute Care Unit and the Cancer Control Agency of British Columbia are used. Textbooks: Dunphy and Way, Current Surgical Diagnosis and Treatment.

451. (1½) *Assessment and Early Management of Multiply Injured Patients*.—Clinical assessment and management of patients with multiple injuries. Skill sessions involve models or simulated trauma patients. Third year elective.

475. *Surgery*.—A 12 week clinical clerkship in surgery. Students, with departmental guidance if requested, should select those surgical services which most closely meet their individual requirements, having in mind their undergraduate training and their career interests. In general surgery the clinical clerkship rotation is of four weeks' duration while rotations in anaesthesiology, cardiothoracic surgery, neurosurgery, ophthalmology, orthopaedics, otorhinolaryngology, plastic surgery, paediatric surgery and urology are of two weeks' duration. During these periods the student is an integral part of these services, attends the outpatient and emergency departments and assists at operation in selected cases. In addition to Service Rounds and Seminars, there are other teaching activities within the department during this 12-week period.

During the Elective period the student may rotate through surgical specialties that he has missed, or if he has decided on a career in any particular specialty he may return to it for further study in depth. The minimal duration of a rotation during this elective period is four weeks.

500. (2) *Experimental Surgery*.—Lectures and seminars dealing with the selected application of surgical techniques in biological investigation.

501. (2) *Surgical Methodology in Research*.—Seminars with the laboratory preparation of advanced procedures used in modern physiological and surgical research.

Courses 502 to 511 consist of a series of two-year courses common to all branches of surgery (core) plus lectures structured for selected major disciplines in surgery.

*502. (1) *Surgical Core*.—The scientific aspects of surgery common to all branches of surgery.

*504. (2) *Advanced General Surgery I*.—Fundamental concepts in general surgery. Given in alternate years.

*505. (2) *Advanced General Surgery II*.—The second year of the above program—given in alternate years.

506. (1) *Advanced Anaesthesiology I*.—Directed studies in anaesthesiology and applied pharmacology and physiology. Given in alternate years.

507. (1) *Advanced Anaesthesiology II*.—The second year of the above program. Given in alternate years.

508. (1) *Advanced Orthopaedics I*.—Selected topics in orthopaedic surgery and related basic sciences. Given in alternate years.

509. (1) *Advanced Orthopaedics II*.—The second year of the above program which will be given in alternate years.

510. (1) *Advanced Urology I*.—Selected topics in urology and related basic sciences. Given in alternate years.

511. (1) *Advanced Urology II*.—The second year of the above program.

512. (1) *Advanced Neurosurgery I*.—Selected topics in neurosurgery and the related basic sciences. Given in alternate years.

513. (1) *Advanced Neurosurgery II*.—The second year of the above program, given in alternate years.

514. (1) *Advanced Plastic Surgery I*.—Seminar and tutorial on selected topics of plastic surgery. Given in alternate years.

515. (1) *Advanced Plastic Surgery II*.—The second year course of the above program. Given in alternate years.

*548. (1-2)c *Seminar in Surgery*.

549. (3/6/9)c *M.Sc. Thesis*.

Cardiovascular and Thoracic Surgery

710. *Cardiac Surgery Seminar*.—Weekly one-hour seminars of cardiac diseases are presented with a view to selecting patients for surgery.

711. *Thoracic Surgery*.—Stress is laid on basic physiology and pathology plus a review of topical literature. Two hours weekly.

712. *Death and Complication Rounds*.—A review of all deaths and complications which have occurred during the preceding month following cardiothoracic surgery, involving analysis of the possible causative factors with emphasis on prevention in the future. Four hours monthly.

713. *Cardiothoracic Surgery*.—The practice of surgery including the basic anatomy, basic technical surgery, cardio-respiratory pathology and pathophysiology, followed by early post-operative care, including intensive care technique.

778. *Cancer Control Agency of B.C. Lung Cancer Conference*.—Neoplasia cases are presented and management discussed, including diagnosis, surgical and non-surgical treatment, and the management of recurrent cancer. One hour weekly.

General Surgery

700. *Journal Conference*.—Residents meet with members of active staff three hours monthly to discuss recently-published surgical literature.

701. *General Surgery Conference I*.—(One service per week). Presentation of clinical cases and problems. Discussion of management of the patient and pathophysiology. All active staff members on service attend. One hour weekly.

702. *General Surgery Conference II*.—Grand rounds (all four services participate). One hour every Wednesday morning. Presentation of cases, symposia, etc., with literature reviews emphasizing pathophysiology, and discussion of management of cases.

703. *General Surgery*.—Residents and Staff discuss disease process and management at the bedside—each of four wards daily.

704. *General Surgery*.—Two hours per week in two general surgery clinics and one hour per week in peripheral vascular and proctology clinics.

705. *General Surgery*.—Practical operative application of general surgery. Anatomy, pathophysiology, surgical judgment, pre- and post-operative care, complications of the disease and surgery are stressed.

*782. *Surgical Core*.—The scientific aspects of surgery common to all branches of surgery.

*784. *Advanced General Surgery I*.—Fundamental consepts in general surgery. Given in alternate years.

*785. *Advanced General Surgery II*.—The second year of the above program - given in alternate years.

*788. *Seminar in Surgery*.

903. *Surgery Review*.—A thirty lecture-demonstration course in general surgery alternating with a similar series in specialty surgery. For post-graduate students proceeding to Certification or Fellowship of the Royal College of Physicians and Surgeons of Canada. One evening per week throughout the winter session.

Neurosurgery

730. *Correlative Clinical Neurosurgery Rounds*.—Residents meet with radiology, neuropathology, and active staff members for discussion of problem cases. One and one-half hours weekly.

731. *Neurosurgery Conference*.—One three-hour session weekly with a member of the active staff, conducted at the bedside or in conference room. Cases reviewed with emphasis on the proper application of diagnostic methods and the indications for operative management.

732. *Neuroradiology*.—Sessions conducted by members of the Department of Radiology in which case histories are reviewed and related to radiological investigation and interpretation. One hour weekly.

733. *Anatomy and Neuropathology in the Brain*.—Sessions conducted by a neuropathologist, Department of Pathology. Attended weekly by neurosurgical resident staff. Two hours weekly.

734. *Operative Neurosurgery*.—Technique of neurosurgical procedures. Anatomy, surgical judgment, pre- and post-operative care. From a general selection of neurosurgical procedures, approximately 950 major neurosurgical procedures per year are carried out under supervision.

Otorhinolaryngology

740. *Otorhinolaryngology Rounds*.—Diagnostic problems of groups of patients with variations of a disease entity are presented and discussed by the residents, Otorhinolaryngology staff and invited specialists from other disciplines. One hour weekly.

741. *Residents' Quiz*.—A one-hour quiz session with both basic science and clinical problems. A reading assignment is given one week prior to the quiz.

742. *Residents' Seminar*.—A 30-minute paper is presented by one of the residents. This is followed by a 30-minute discussion between the residents and attending otorhinolaryngology staff. One hour weekly.

743. *Basic Science Seminar*.—Consists of a series of basic science lectures given by members of the otorhinolaryngology staff and members of the Medical School Faculty. These cover anatomy, physiology, pharmacology, and pathology of ear, nose and throat, and are held for two hours each week for four months.

744. *Otorhinolaryngology Lecture Series.*—A basic course in clinical otorhinolaryngology given by members of the medical staff, for two hours per week for eight months.

745. *(i) Gross Anatomy Dissection.*—Consists of anatomical dissections of the head and neck by otorhinolaryngology residents, under supervision of otorhinolaryngology and anatomy Faculty.
(ii) Surgical Anatomy.—Anatomical dissection by the residents, with particular attention to otorhinolaryngological surgical procedures, supervised by otorhinolaryngology staff.

746. *Otorhinolaryngology Conference.*—Twice per month. This consists of a series of lectures, primarily from related disciplines, providing instruction to the otorhinolaryngology residents and staff in general medical and surgical problems. The lecture period is one hour, followed by a one hour period of discussion.

773. *Otorhinolaryngology Operating Room.*—Techniques of surgical procedure are taught by otorhinolaryngology staff.

778. *Ear, Nose and Throat Tumor Conference at the Cancer Control Agency of B.C.*—New patients with tumours of the head and neck are presented to, and discussed by, the otorhinolaryngology residents and attending staff one hour weekly.

Paediatric Surgery

755. *Paediatric Surgery.*—A clinically-oriented course with case presentations of surgical conditions particularly related to childhood. One hour weekly.

756. *Paediatric Surgery Conference II.*—One member of attending staff discusses cases on bedside rounds for one hour weekly. Approaches to investigation and supportive care are stressed.

757. *Paediatric Surgery.*—Residents learn operative skills, judgment and supportive measures as applied to surgery of children and neonates.

758. *Advanced Paediatric Surgery.*—In-depth experience in all facets of paediatric and neonatal surgery for those who have made a career choice in the specialty, with particular reference to clinical decision making, specific operative techniques and postoperative care of paediatric patients.

Plastic Surgery

750. *Plastic Surgery Conference.*—Presentation of clinical cases with discussion of the underlying pathophysiology as related to patient management. One hour weekly.

751. *Plastic Surgery Seminar Course.*—A two-hour weekly seminar course spread over two years, for discussion of embryology, anatomy, physiology and pathology relative to the specialty of plastic surgery. These basic science aspects are discussed in relation to patient management.

752. *Plastic Surgery, Operating Room.*—Techniques of surgery and the relative anatomy and pathophysiology are discussed.

Therapeutic Radiology (Cancer Control Agency of B.C.)

770. *Grand Rounds.*—Rounds are held each week and last one hour. They consist of presentations by residents of clinical cases, with history and physical findings. Residents in radiation oncology with other residents from the departments of medicine, surgery and gynaecology participate during periods of duties in the Cancer Control Agency. General aspects of clinical oncology and management of patients are discussed critically with all staff in attendance.

771. *Radiation Therapy Conference.*—These clinical conferences are held four days each week and are of varied duration. Presentation of problems in management of selected patients is discussed with residents and all staff members. Emphasis is placed on analysis of problems and on radiation treatment in particular.

772. *Staff Seminars.*—A series of weekly presentations, each of one hour duration, throughout the academic year. Invited outside speakers, as well as Cancer Control Agency staff, cover a range of current cancer-related topics of broad interest, from basic science to clinical subjects.

773. *Radiation Oncology.*—Residents are allocated to the service of one or two staff members on two-monthly rotations. On each service, they are personally supervised in ward management of patients and, in addition, receive practical experience in the planning and execution of radiation treatments, using the gamut of radiation modalities.

774. *Basic Science Lecture—Physics.*—This course spans 18 months. It occupies four hours of lectures each week in the evening plus one hour per week tutorial. In addition, practical laboratory experiments are undertaken. The course is supervised by the senior physicist.

775. *Basic Science Lecture—(i) Radiobiology.*—A series of nine lectures of one hour each week, given in the second year of resident training, supervised by Head of Department of Biophysics.
(ii) Tumour Pathology.—A series of twelve weekly one hour lectures given by pathologists to the Cancer Control Agency. These cover selected topics, augmenting clinical lectures.

776. *Clinical Lectures.*—A series of didactic lectures spanning a two-year period. Lectures are of one hour duration, two per week, with emphasis on radiation oncology but also including chemotherapy and immunotherapy. Lectures are given by radiation and medical oncologists on staff. In addition, a series of "current concept reviews" is given by colleagues from the attending medical staff outside the discipline of radiation oncology.

778. *Joint Interdisciplinary Oncology Clinical Conference.*—These clinical conferences are held throughout the course of each week by the permanent staff of the Cancer Control Agency of B.C., in conjunction with members of the attending medical staff, with residents in attendance. Special conferences scheduled include: Otorhinolaryngology, Urology, Eyes, Lymphoma, Gynaecology, Head and Neck, Lung, Skin and Breast, each of minimal duration of one hour. The format of these clinical presentations varies, some emphasizing evaluation of new and follow-up patients, others primarily comprehensive teaching clinical conferences illustrating selected aspects of malignancy in that site. The assessment of patients and the extent of disease, the selection of treatment method and management problems are fully discussed.

Urology

760. *Urology Conference I.*—Presentation of clinical cases and subject reviews.

761. *Urology Conference II.*—This is held at Shaughnessy Hospital and involves a review of clinical material and subject review. One hour weekly.

762. *Urologic Radiology.*—Two hours per week spent on review of accumulated basics in radiology as well as current clinical material. This is supervised by urology and radiology staff members.

763. *Paediatric Urology.*—Current clinical material review as well as subject review for two hours per month.

764. *Urology Seminars.*—A weekly two-hour meeting with urology staff members on subject review and basic urology, physiology, and surgery.

765. *Urologic Surgery.*—The application of urology with discussion of techniques of surgery, anatomy, pathology, pathophysiology and complications of diseases. Two hours weekly.

778. *Cancer Control Agency of B.C. Rounds.*—Detailed discussion of urologic neoplasia with reference to management utilizing radiotherapy, chemotherapy, and general urology. One hour weekly.

Swedish—See Germanic Studies (Faculty of Arts)

Theatre (Faculty of Arts)

120. (3) *Introduction to Theatre.*—Theory and practice of the theatrical arts; the development of Western theatre; reading of representative plays. The plays presented by the Frederic Wood Theatre during its Winter season will be studied in this course; students must obtain season tickets during registration. [3-0; 3-0]

200. (3) *Introduction to Acting.*—Speech and acting. (Open to all students, in First Year and above. Audition required.) The plays presented by the Frederic Wood Theatre during its Winter season will be studied in this course; students must obtain season tickets during registration. [2-2; 2-2]

220. (3) *Play-Interpretation and Production-Analysis.*—Basic methods of interpreting dramatic texts and analyzing plays in performance. [3-0; 3-0]

230. (3) *Introduction to Film and Television.*—An introduction to the development, the techniques, and the social and artistic functions of film and television. Lectures, demonstrations and discussions of the technology, history and criticism of these media and of selected films and television productions. (A lab fee will be collected at Registration to cover the cost of film showings. See Index—Fees "Special Fees".) [2-2; 2-2]

233. (1½) *Principles of Film and Television Production.*—A beginning course designed for the student with no previous experience in production. The course will familiarize the student with basic equipment and tools, and introduce him to the elementary principles of production. Preference given to those who are taking Theatre 230 concurrently. Laboratory fee will be charged. [1-2]

250. (3) *Introduction to Technical Theatre.*—An introduction to the crafts of scenery and costume design and construction. Must be taken concurrently with Theatre 251. Priority given to B.F.A. students. [2-2; 2-2]

251. (3) *Technical Theatre Practice.*—A laboratory course designed to develop the student's design and technical skills. Where possible, assignments are co-ordinated with the production program. Must be taken concurrently with Theatre 250. [0-6; 0-6]

261. (3) *Intermediate Acting.*—Development of Control and Expressiveness of the voice and body. Textual analysis and performance of short scenes. Prerequisite: Theatre 200. Audition required. The plays presented by the Frederic Wood Theatre during its Winter season will be studied in this course; students must obtain season tickets during registration. [2-3; 2-3]

262. (3) *Speech and Movement.*—Development of the student's awareness of the voice and body as communicative instruments, and the beginning of the technical control of both. To be taken in conjunction with Theatre 261. Open only to B.F.A. (Acting) students. [2-2; 2-2]

310. (3) *History of the Theatre to 1700.* [3-0; 3-0]

320. (3) *History of Modern Theatre.*—The development of Western theatre since 1700, with emphasis upon the twentieth century. [3-0; 3-0]

325. (1½) *History of Canadian Theatre.* [3-0]

330. (3) *History of the Film.*—(A lab fee will be collected at Registration to cover the cost of film showings. See Index—Fees "Special Fees".) (Also listed as Fine Arts 393) [2-2; 2-2]

333. (3) *Introduction to Film Production.*—Prerequisite: Theatre 230 and consent of instructor. Laboratory fee will be charged. [2-3; 2-3]

334. (3) *Animation.*—History, theory, technique, and design of animated films. Prerequisite: Theatre 230 and consent of instructor. (A lab fee will be collected at Registration to cover the cost of film stock and processing. See Index—Fees "Special Fees".) [2-3; 2-3]

340. (3) *History of the Oriental Theatre.*—Open to all students in third year and above. [3-0; 3-0]

350. (3) *Theatrical Production.*—Technical Theatre. [2-3; 2-3]

361. (3) *The Role: Interpretation and Characterization.*—Emphasis will be on externalizing the inner character in conjuction with work in textual analysis, improvisation and internal techniques. Prerequisite: Theatre 261 and consent of instructor. [2-3; 2-3]

362. (3) *Advanced Speech and Movement.*—The course is designed to develop the student's awareness of the expressive qualities of the voice and body and to begin learning techniques of control. Prerequisite: Theatre 261 and 262. This course must be taken in conjunction with Theatre 361 and 370. Open only to B.F.A. (Acting) students. [1-4; 1-4]

363. (1½) *Voice and Speech.*—A course in voice-production, diction, and oral interpretation, designed to cultivate effective and expressive speech. Prerequisite: Theatre 120 or 200 recommended. [2-2]

370. (3) *Tutorial in Acting.*—Development of the student's talent and skill through an intensive program of individual instruction. To be taken in conjunction with Theatre 361/362. Open only to students in the B.F.A. program. [2-2; 2-2]

371. (3) *Tutorial in Design and Technical Theatre.*—Individual instruction in one or more areas of design and technical theatre. Prerequisite: Theatre 250/251. Open only to students in the B.F.A. program. [2-2; 2-2]

400. (3) *Direction and Staging.*—Prerequisite: Theatre 200 and consent of instructor. [3-2; 3-2]

405. (3) *Design for the Theatre.*—The history, theory and practice of theatrical design. [2-3; 2-3]

410. (3) *Forms of Theatre.*—An examination in depth of a limited number of plays representative of the forms of theatre that have had the most significant and enduring influence upon the development of theatre from the Greek era to the present. Prerequisite: Theatre 310 or 320. [3-0; 3-0]

430. (3) *Theory of Drama and Performance.*—The basic principles of dramaturgy and theory of performance. Historical and contemporary writing on theatrical theory and criticism and their relation to theatrical practice. [3-0; 3-0]

431. (3) *Film Aesthetics and Criticism.*—The nature and principles of film as an art and the development and problems of film criticism. Detailed analysis of particular films and reading and discussion of a considerable number of writings on and related to film. Prerequisite: Theatre 330 and consent of instructor. (A lab fee will be collected at Registration to cover the cost of film showings.) [3-0; 3-0]

433. (3) *Projects in Film and Television.*—Advanced research, design, and analysis of film and television projects. Prerequisite: Theatre 333 and consent of instructor. Laboratory fee will be charged. [2-3; 2-3]

434. (3) *Studies in Film and Television.*—A seminar devoted to a topic of current interest in film and television. Topic will change from year to year. May be repeated for credit when topics differ. [3-0 3-0]

449. (3) *Supervised Study and Honours Essay.*

450. (3) *Stage Lighting.*—The study of the art of lighting for the theatre, including optics, colour, equipment and control. Theoretical and practical problems of light plots. Prerequisite: Theatre 350. [2-3; 2-3]

455. (3) *Advanced Technical Theatre and Stage Management.*—Prerequisite: Theatre 350. [2-2; 2-2]

461. (3) *Styles in Acting.*—An introduction to styles of acting in various historical periods and contemporary media, along with continued work on characterization in leading and supporting roles in full-length plays. Prerequisite: Theatre 361 and consent of instructor. [2-3; 2-3]

462. (3) *Styles in Speech and Movement.*—The student will study speech and movement as they relate to social and theatrical history. Comparisons will be drawn between the styles of literature, costume, furniture and speech and movement. Prerequisite: Theatre 361 and 362 and 370. Must be taken in conjunction with Theatre 461 and 470. Open only to B.F.A. (Acting) students. [1-4; 1-4]

470. (3) *Advanced Tutorial in Acting.*—Development of the student's talent and skill through an intensive program of individual instruction. Prerequisite: Theatre 370. Open only to students in the B.F.A. program. [2-2; 2-2]

471. (3) *Advanced Tutorial in Design and Technical Theatre.*—Further supervised study in the student's area of specialization. Open only to B.F.A. students. [2-2; 2-2]

500. (1½) *Bibliography and Research Methods.*

505. (3) *Scene Design.*

506. (3) *History and Design of Theatrical Costume.*

510. (3) *Seminar in Comparative Dramatic Literature.*

515. (1½/3)**d** *Seminar: Studies in Theatrical Style.*

520. (3) *Direction and Production.*

521. (3) *Styles in Directing.*—An advanced course in directing; detailed study of the major styles in the history of production. Prerequisite; Theatre 520.

525. (3) *Seminar: Study of a Major Dramatist.*

530. (3) *Seminar: Relationships Between Theatre and the Other Arts.*—Studies in a selected area of theatre in relation to one or more of the other arts.

531. (3) *Seminar: Styles in Film/Television.*—Studies and experimentation in styles or genres in film/television such as the documentary, the narrative film, the scientific film, the ethnographic film, the experimental film, etc. Topics will vary from year to year.

532. (3) *Seminar: Study of Major Film/Television Artists.*—Investigations into the biographical, social and national backgrounds of two or three major artists, with attention to the specific nature of their work in its historical, psychological, and cultural contexts. Topics will vary from year to year.

533. (3) *Advanced Problems in Film/Television Production.*—Advanced production techniques. The student will be expected to master advanced production techniques in such areas as sound mixing, colour cinematography, special effects, synchronous dialogue editing, scripting, and directing.

534. (3) *Seminar in Film and Television Studies.*—Topics to be arranged.

535. (1) *Colloquium in Film/Television.*—A discussion of current research and production by graduate film/television students. Presentation of papers and progress reports.

547. (1½/3)**d** *Directed Studies in Theatre and Drama and Film/Television.*

549. (3/6/9)**c** *Master's Thesis.*

550. (3) *Seminar: Advanced Problems in Design and Theatre Architecture.*—A study of recent trends in theatre architecture and technical equipment and their inter-relationship with the problems of production.

560. (1½/3)**d** *Studies in Theatrical History.*

561. (1½/3)**d** *Studies in Dramatic Literature.*

562. (1½/3)**d** *Studies in Dramatic Theory and Criticism.*

649. *Ph.D. Thesis*

Ukrainian (Department of Slavonic Studies. Faculty of Arts)

325. (3) *Basic Ukrainian.* [3-0; 3-0]

425. (3) *Advanced Ukrainian.*—Prerequisite: Ukrainian 325. [3-0; 3-0]

Urban Studies—(Faculty of Arts)

200. (3) *Cities.*—An introduction to urban patterns and processes, from the perspectives of various disciplines. Guest lectures, discussion groups, field trips. [2-2; 2-2]

400. (1½) *Seminar in Urban Studies.*—A seminar for senior students who are anxious to explore some common topics of importance to urban studies from the view points of several disciplines. Enrolment by permission of the instructor. [0-0; 1-2]

Urdu—See Asian Studies: Indic Languages.

Women's Studies—(Faculty of Arts)

222. (3) *Introduction to Women's Studies.*—An interdisciplinary exploration of the situation of women in various societies, both past and present. Theoretical analyses, research, and literary sources are used to broaden understanding of the determinants of women's experience. [3-0; 3-0]

224. (3) *Women in Literature.*—Techniques of literary study, with emphasis on the ways in which women are represented in and have contributed to the literary tradition. [3-0; 3-0]

See also Anthropology-Sociology 213—*Women in Comparative Perspective,* Psychology 320—*Psychology of Sex Differences,* Classical Studies 304—*Women in Classical Antiquity,* Slavonic Studies 446—*Women in Russia; French 419—Women's Literature in France and French Canada.*

Wood Science and Industry (Department of Harvesting and Wood Science, Faculty of Forestry)

335. (1½) *Principles of Industrial Quality Control.*—Statistical quality control methods, acceptance sampling inspection, and economic aspects of quality control. Prerequisites: Forestry 130, Mathematics 205, Statistics 204 or 251. [0-0; 3-0]

353. (1½) *Mill Site Visits.*—Two weeks of on-site study of forest products manufacturing plants immediately following Spring examinations of Second Year. Representative sawmills, plywood mills, remanufacturing plants, particle board manufacturers, pulp mills, laminated timber plants and wood preservation facilities on the Coast and in the Interior are studied. Fees will be assessed to meet expenses. (See Index—Fees "Special Fees".)

371. (1½) *Wood Deterioration and Protection*—Destructive effects of fungi, insects, marine borers, fire, and weathering on wood products in service. Prevention and control through sanitation, proper utilization and construction practices and preservative treatments. Decay and pathogens in living trees and consequences for utilization. Given 1986/87 and in alternate years thereafter. Prerequisite: Wood Science and Industry 375. [3-2; 0-0]

372. (1½) *Wood Physics and Mechanics.*—Elementary physical properties of wood related to its behaviour, processing and use; growth characteristics; anisotropy, response to moisture and heat; basic mechanics of wood and paper subjected to external forces; application of principles to practical situations. Prerequisite: Wood Science and Industry 375. [0-0; 2-2]

373. (1½) *Timber Structures and Design.*—Design of engineered structural elements with emphasis on wood; load duration; stress grades; sawn and glued laminated members; limiting stress; deflection; elastic instability; combined loads; timber joints and fasteners. Prerequisites: Physics 170, Wood Science and Industry 372 or Civil Engineering 230. [2-3; 0-0]

374. (1) *Basic Properties of Wood and Wood Products.*—Anatomical, mechanical and physical properties of wood as related to production and engineering applications of lumber, plywood; glued-laminated wood and composite products. Anisotropic behaviour, rheological properties, wood-liquid relationships, thermal effects, decay mechanisms. Influence of preservative treatments and drying processes. Material variability and its relevance to quality control and engineering analysis. [2-2; 0-0]

375. (1) *Wood Anatomy, Properties and Identification.*—Anatomical structure and identification of wood based primarily on hand lens features; elementary chemical, physical and mechanical properties of wood and their variations in relation to structure. Corequisite: Forestry 111. [2-2; 0-0]

377. (1½) *Wood Microscopic Properties and Ultrastructure.*—Comparative microscopic anatomy of wood; histological methods and light and electron microscopic techniques for wood observation. Prerequisite: Wood Science and Industry 375. [0-0; 2-4]

461. (1½) *Forest Products Utilization.*—Technical and economic constraints and responses in the wood-using industry that influence forest products utilization; competing wood industry regions. Prerequisite: Economics 100, Wood Science and Industry 375, 480. [0-0; 3-0]

470. (1½) *Commercial Timbers of the World.*—Systematic study of commercial tree species, their identification, wood structure, properties and utilization. Survey of Europe, Latin America, Africa, Asia, and Oceania by plant families. Prerequisites: Forestry 111, Wood Science and Industry 375. [0-0; 2-2]

473. (1½) *Wood Chemistry and Chemical Utilization.*—Wood chemical composition; cellulose, hemicelluloses, lignins and extractive structures, reactions and responses in wood, pulp, and derivatives processing; wood as energy source. Prerequisite: Chemistry 253 or 230. [0-0; 3-4]

480. (1½) *Forest Products Manufacturing and Distribution.*—Introduction to the methods used in the manufacture of British Columbia's major forest products: lumber, pulp, newsprint and composite wood panel products; methods and systems of distribution and movement of wood products to world markets. Prerequisite: Wood Science and Industry 375. [3-2; 0-0]

482. (1) *Wood Drying and Finishing.*—Principles and methods of seasoning of forest products; principles of finishing wood. Prerequisite: Forestry 372. [2-2; 0-0]

484. (1½) *Wood Milling and Machining.*—Fundamentals of the machining process applied to the various cutting operations essential to wood utilization; tree shears; chain, circular and band saws; surfacers; veneer cutting; chippers and flakers; abrasive machining; high velocity jets, ultrasonics and other emerging cutting technologies. Prerequisite: Forestry 375. Wood Science and Industry 372 strongly recommended. [2-3; 0-0]

487. (1½) *Glued Wood Products.*—Examination of physical, chemical and mechanical variables involved in cold, hot- and non-conventional adhesive bonding of wood; preparation and characteristics of adhesives. Evaluation of production methods, plant design criteria and engineering requirements in manufacture of plywood, laminated wood and wood composite products. Prerequisite: Wood Science and Industry 375; corequisite: Wood Science and Industry 480. [0-0; 2-3]

488. (1½) *Sawmill Systems Analysis.*—Introduction to methods for estimating production rates, and yield of lumber and residue. Cost accounting and economic analysis including marginal log analysis. Computer applications of sawmill simulators. Corequisite: Forestry 331. [2-2; 0-0]

Zoology (Faculty of Science)

Note: Biology 101 or 102 is prerequisite to all courses in Zoology except Zoology 153 and 400.

**Additional fees are charged for these courses. See "Special Fees" P. 22.

**153. (3) *Human Biology.*—An introduction to the principles of biology with particular reference to the human body. Laboratories will be integrated with the lecture material, and will include an examination of fundamental tissues and selected experiments on organ physiology. Open only to students in the School of Nursing. [3-3; 3-3]

**203. (1½) *Comparative Vertebrate Zoology.*—Introduction to the vertebrate phyla and their evolution; a comparative study of vertebrate structure and function, with dissection of representative forms. [3-3; 0-0]

**205. (1½) *Comparative Invertebrate Zoology.*—An introduction to the invertebrate phyla. [0-0; 3-3]

206. (3) *Comparative Invertebrate and Vertebrate Zoology.*—Introduction to all the major phyla and their evolution. A comparative study of structure and function, with dissection of representative forms. Offered in the Summer Session only. Credit will be allowed for only one of Zoology 206 and Zoology 203 plus 205.

**303. (3) *Vertebrate Physiology.*—Lectures and laboratories in organismic physiology with an emphasis on vertebrate physiology. Prerequisite: Chemistry 203 or 230 or permission of Head of the Department. Credit will be allowed for one only of Zoology 303 or Physiology 301. [3-3*; 3-3*]

**304. (1½) *Developmental Biology.*—Animal development and its underlying causal principles; introductory embryology. Prerequisites: Biology 200, 201. Biochemistry 300 or 302 or 303 is recommended. [0-0; 2-3]

305. (1½) *Biology of Invertebrates.*—A comparative study of invertebrates, with emphasis on marine forms. An investigation of structure and function, life histories, evolution, and ecology. Prerequisite: Zoology 205. Primarily for students in Third or Fourth Year. [2-3; 0-0]

306. (1½) *Introduction to Animal Mechanics and Locomotion.*—Comparative aspects of the functional design of skeletal systems and the mechanics of swimming, flying and terrestrial locomotion, with particular reference to the vertebrates. [0-0; 3-0]

307. (1½) *Comparative Environmental Physiology.*—A survey of physiological adaptations of animals to different environments. Pre- or co-requisite: Zoology 303, or Physiology 301, or permission of Head of the Department. [0-0; 3-0]

311. (1½) *Introduction to Entomology.*—A survey of the structure, classification and biology of insects, with an introduction to spiders, mites and ticks. [0-0; 2-3]

316. (1½) *Introduction to Biological Oceanography.*—An introduction to descriptive biological oceanography covering the plankton community and its relation to the physical/chemical environment of the sea. The practical importance of biological oceanography to fisheries management and pollution problems will be emphasized. Prerequisite: Third year standing required. Corequisite: Biology 321, or permission of Head of the Department. Zoology 316/Oceanography 316 are the same course. [2-0-1; 0-0-0]

323. (1½) *Introduction to Animal Behaviour.*—An introduction to the ethological approach to the study of animal behaviour. Emphasis is placed upon social behaviour. Physiological mechanisms underlying behaviour are also considered briefly. There will be no formal laboratory sessions but students will be expected to attend tutorial sessions and to carry out a short project in the laboratory or field (see also Zoology 423). Prerequisite: completion of second year Zoology or Biology or permission of Head of Department. [3-0-2; 0-0-0]

325. (1½) *Laboratory in Eukaryotic Genetics.*—A laboratory course demonstrating the fundamental principles of inheritance utilizing primarily *Drosophila, Paramecium* and the free-living nematode, *Caenorhabditis elegans*. The experiments are designed to illustrate a variety of topics including Mendel's Laws, sex-linkage, genetic mapping, mutagenesis, chromosome structure, developmental, biochemical and population genetics. Prerequisite: Biology 334 (may be taken concurrently). [0-0; 1-4]

340. (1½) *Principles and Methodology in Zoological Research I.*—An introduction to contemporary research in Zoology, familiarization with current research within the Department; history and methodology of scientific discovery; seminars on current problems. Highly recommended for Third Year Honours students in Zoology. Not to be taken concurrently with Zoology 449. [0-0; 2-3]

400. (3) *Principles and History of Biology.*—Consideration of scientific methodology, history and philosophy. Prerequisite: Fourth Year standing in any degree program. [3-0; 3-0]

**402. (1½) *Evolution.*—A critical appraisal of the evidence for evolution; a consideration of the basic principles of natural selection and the nature and origin of species and higher categories. Prerequisite: Third Year major or honours. [0-0; 3-0]

403. (3) *Terrestrial Animal Ecology.*—Advanced topics in ecology of animals in terrestrial environments. Emphasis on laboratory and field experiments designed to illustrate principles. Examination of sampling problems of populations and communities in forest, grassland, and intertidal areas. Three weekend field trips required. This course is designed to be taken concurrently with Zoology 316 and 404. Prerequisites: Biology 321, 322, 300. [2-4; 2-4]

404. (1½) *Aquatic Ecology I.*—Introduction to theoretical and applied aspects of limnology. Consideration of the ecology of inland water animals in relation to physical, chemical and biological factors affecting their interactions and production. Non-lecture sessions will involve either (a) field sampling methods and laboratory exercises including an individual study project and major report (consent of Instructor required) OR (b) directed seminars, discussions and readings arranged to culminate in an individual report. This course is designed to be taken sequentially with Zoology 316. Prerequisites: Biology 321, 322, Biology 300 (may be taken concurrently). [2-4; 0-0]

405. (1½) *Molecular Adaptation of Animals to the Environment.*—Biochemical strategies in the adaptation of animals to their environments. Emphasis will be placed on the adaptations of animals at the molecular level to the problems posed by their morphology, physiology and environment. Prerequisite: Biochemistry 300, 302 or 303; Zoology 428 recommended. [0-0; 3-0]

406. (1½) *Aquatic Ecology II.*—A practical course in analytical techniques and field operations as used in biological oceanography. Pre- or co-requisite: Oceanography/Zoology 316 or permission of Head of the Department. Zoology 406/Oceanography 406 are the same course. [0-0-0; 1-4-1]

407. (3) *Selected Topics in Eukaryotic Cell Differentiation and Morphogenesis.*—An advanced coverage of the following topics: chromosome organization, structure and function; the regulation of gene expression: developmental genetics; biochemical aspects of cellular differentiation, the cell cycle and the control of differential gene activity; cell interactions and morphogenesis. Prerequisites: Zoology 304; Biochemistry 300, 302 or 303; Biology 334. Recommended: Zoology 417 to be taken concurrently. [3-0; 3-0]

408. (1½/3)c *Physiology Laboratory.*—Schedule of experiments to be chosen in consultation with the instructor from the following areas: neuromuscular, sensory, circulatory, respiratory, endocrinological and exercise physiology. For 1½ units students must complete 4 experiments; for 3 units students must complete 8 experiments. Prerequisite: Zoology 303. Corequisite: one of Zoology 307, 405, 428, 429 or 431, or permission of the Head of the Department. [0-6; 0-6]

409. (1½) *Functional and Comparative Histology of the Vertebrates.*—A functional and comparative study of vertebrate organ systems with particular emphasis on fishes, amphibians and mammals. For students in the field of Comparative Anatomy, Vertebrate Zoology and Physiology. Prerequisite: Biology 302. [1-4; 0-0]

410. (3) *Entomology.*—A detailed consideration of selected aspects of entomology, functional morphology, taxonomy, biology and physiology of insects. Prerequisite: Zoology 311. [2-3; 2-3]

411. (1½) *Biomechanics.*—An analytical approach to the study of skeletal mechanics and animal locomotion. Selected topics in the structure and properties of biological materials, the functional design of skeletons for locomotion, and the fluid mechanics of swimming and flight. Prerequisite: Zoology 306. [2-3; 0-0]

412. (1½) *Zoogeography.*—Distribution of terrestrial and aquatic animals in space and time; restricted to students in Third and Fourth year. [0-0; 3-0]

413. (3) *Introductory Parasitology.*—Classification, morphology, life histories of animal parasites affecting domestic and wild animals and man. [2-3; 2-3]

414. (3) *Marine Invertebrate Zoology.*—An advanced course on selected topics of morphology, physiology and life histories of marine invertebrates. Prerequisites: Zoology 205, 301 or 305. [2-3; 2-3]

**415. (3) *Biology of Fishes*.—Classification, identification, life histories and ecology of fishes, with an introduction to the study of their marine and freshwater environments. Prerequisite: Zoology 306. [2-3; 2-3]

**416. (3) *Terrestrial Vertebrate Zoology*.—The forms, function and evolution of terrestrial vertebrates, as related to their distribution and abundance. The laboratory includes classification, life histories, and ecology of terrestrial vertebrates with particular attention to British Columbia. Prerequisite: Zoology 203. [2-3; 2-3]

417. (1½) *Advanced Laboratory in Eukaryotic Cell Differentiation and Morphogenesis*.—Advanced experimental laboratory techniques for the analysis of differentiation and morphogenesis at the cellular, genetic and biochemical levels. This course is designed to be complementary to the lectures in Zoology 407 and it is recommended that the two courses be taken concurrently. Prerequisites: Zoology 304, Biology 334 and one of either Biology 201 and Biochemistry 300 or 302 or 303. [0-0-0; 0-6-1]

419. (1½) *Histochemistry*.—The theory and practice of histological and histochemical methods. Reference will be made to techniques suitable for use with phase contrast, fluorescence, electron and light microscopes. [0-0; 1-4]

420. (1½) *Cell Biology of Protists*.—Cell Biology of Protists. Structure, feeding and food processing, cultural cycles, cell cycle events and their control and integration, morphogenesis, genetics, and the physiological basis of behaviour in unicellular eukaryotes. Emphasis on biology of Ciliates. Prerequisite: 3rd year standing in Life Sciences. Biology 315 suggested. Offered in alternate years. [0-0-0; 2-3-1]

421. (3) *Principles of Applied Ecology*.—Principles of animal and community ecology applicable to the management of animal resources; application of statistical and computer techniques for measuring, analyzing, modelling, and simulating resource systems; problems of multiple resource use. [2-2; 2-2]

423. (1½) *Animal Behaviour Laboratory*.—Laboratory sessions and the development of an individual problem; seminars on selected topics in animal behaviour. Prerequisite: Zoology 323. [0-0; 2-3]

424. (1½) *Comparative Histology and Histophysiology*.—Fundamental tissues; selected experiments on environmental and pathological effects on tissue and organ architecture. [0-0; 1-4]

425. (1½) *Advanced Problems in Animal Genetics*.—A study of advanced problems and concepts in chromosome mechanics, gene structure and fine structural analysis, gene conversion, mutagenesis and population genetics. Prerequisite: Biology 334 or equivalent: Zoology 407 and 417 recommended corequisites. [2-4; 0-0]

427. (1½) *Evolutionary Morphogenesis*.—A comparative study of gametogenesis, early development and differentiation in vertebrates and invertebrates. Relationships between molecular and morphogenetic aspects of development stressed. Prerequisite: Zoology 304: pre-or co-requisite: Biochemistry 300 or 302. [0-0-0; 2-3-1]

428. (1½) *Comparative Physiology*.—Selected topics in physiology emphasizing comparisons between diverse phylogenetic groups of animals. Prerequisite: Zoology 303, Physiology 301, Psychology 360, or Biology 330. [3-0; 0-0]

429. (1½) *Comparative Neurobiology*.—Seminar discussions of selected topics. Current approaches in neurobiology, from the cellular to the behavioral level, are examined using representatives of vertebrate and invertebrate nervous systems. Prerequisite: Zoology 303, Physiology 301, Psychology 360, or Biology 330. [3-0; 0-0]

**430. (1½) *Field Course in Animal Ecology*.—A two week intensive course in field methods used in animal ecology. The course will be given in the autumn in the two weeks before the first term. Individual projects will be carried out in selected habitats of coastal and interior B.C. A fee will be assessed to meet living expenses. Pre-registration is required. Prerequisites: Biology 321, 322 (or 323), 300. Zoology 323 recommended.

431. (1½) *Comparative Endocrinology*.—A comparative study of vertebrate and invertebrate endocrinology. Prerequisite: Zoology 303 or Physiology 301 or permission of Head of Department. [0-0; 3-0]

440. (1½) *Principles and Methodology in Zoological Research II*.—Seminars, debates, workshops and tutorials designed to produce competence in specific areas of Zoology. Required of, and restricted to, Honours students in Zoology. [2-3; 0-0]

448. (1½/3)c *Directed Studies in Zoology*.—A course designed to allow students to undertake an investigation of a specific topic in zoology beyond the level possible in a scheduled course. Individual requirements to be clearly outlined and agreed by the faculty and student, and approved by the Head.

449. (3) *Zoology Honours Thesis*.—Directed investigation of a problem requiring a written scientific report and a final oral examination. For Honours students only. Not to be taken concurrently with Zoology 340.

500. *Special Advanced Courses*.—Special advanced courses correlated with the work for the thesis may be arranged for a graduate student upon the approval in writing of the Head of the Department. The credit will not be more than 3 units in any one such course.

502. (3) *Advanced Ecology*.—Current problems in theoretical and applied ecology at the level of the population community and ecosystem.

503. (3) *Advanced Comparative Physiology*.—Selected topics in animal physiology. Offered in alternate years.

504. (1½) *Ethology Seminar*.—Current problems in animal behaviour.

505. (3) *Cell Biology*.—Problems and recent advances in the study of mechanisms underlying the structure, function and differentiation of cells.

509. (1½) *Advanced Animal Population and Quantitative Genetics*.—A seminar on advanced topics in animal population and quantitative genetics. Current problems and recent advances will be emphasized. Prerequisites: One of Biology 510, Plant Science 510, Animal Science 414, Biology 434, or an equivalent course. (Offered in alternate years.)

510. (1½) *Developmental Genetics*.—Recent advances in the study of mechanisms of the genetic control of development. Offered in alternate years.

512. (2) *Marine Invertebrate Zoology*.—Seminar discussion of selected topics in marine invertebrate zoology. Offered in alternate years.

515. (3) *Comparative Invertebrate Embryology*.—A study of morphogenesis and developmental physiology of representatives of the invertebrates with laboratory concentration on the local marine forms. Prerequisite: Zoology 205. Offered in alternate years.

516. (3) *Advanced Entomology*.—Lectures and directed studies of advanced entomological problems. Offered in alternate years.

519. (3) *Parasitology*.—Seminar discussions of selected topics. Basic problems of parasitism, trends in current research. Laboratory procedures in parasitology; individual projects. Prerequisite: Zoology 413. (Given as required.)

521. (3) *Fisheries Biology and Management*.—A study of world fisheries that presently or potentially can be utilized; including consideration of sport and non-extractive use. World aquatic renewable resources are explored in a framework of biological, technological and institutional factors. Theoretical and applied approaches to management are examined in depth including techniques of analysis, synthesis and implementation. Prerequisite: Permission of the Instructor.

522. (2) *Limnology Seminar*.—Current problems and recent advances in limnology. Prerequisite: Zoology 502. Offered in alternate years.

525. (1½) *Problems in Systematics and Evolution*.—Seminar discussions of selected topics. Offered in alternate years.

527. (2) *Theoretical Population Dynamics*.—Discussion of dynamics of exploited populations and related theoretical ecology. Emphasis will be placed on mathematical models and their application to population problems. Recommended to be taken in conjunction with Zoology 502.

528. (3) *Advanced Ichthyology A*.—A comprehensive survey of the morphology, phylogeny, palaeontology, life histories and literature of primitive fishes, including Cyclostomes, Elasmobranchs, and the soft-rayed Teleosts. Lectures, seminars and laboratory dissection.

529. (3) *Advanced Ichthyology B*.—A survey similar in treatment to Zoology 528, but covering primarily the Perciform fishes.

Note: Zoology 528 and 529 may be taken in the reverse order.

530. (2) *Vertebrate Reproduction*.—Reproduction biology of mammals and other vertebrates. Comparison of factors influencing reproductive mechanisms and performance in various vertebrate groups. Offered in alternate years.

531. (2) *Ornithology*.—Phylogeny, morphology and biology of birds; factors affecting their abundance and distribution. Offered in alternate years.

532. (2) *Mammalogy*.—Phylogeny, morphology, and biology of mammals; factors affecting their abundance and distribution. Offered in alternate years.

533. (2) *Problems in Wildlife Population Ecology*.

549. (3/6/9)c *M.Sc. Thesis*.

649. *Ph.D. Thesis*.

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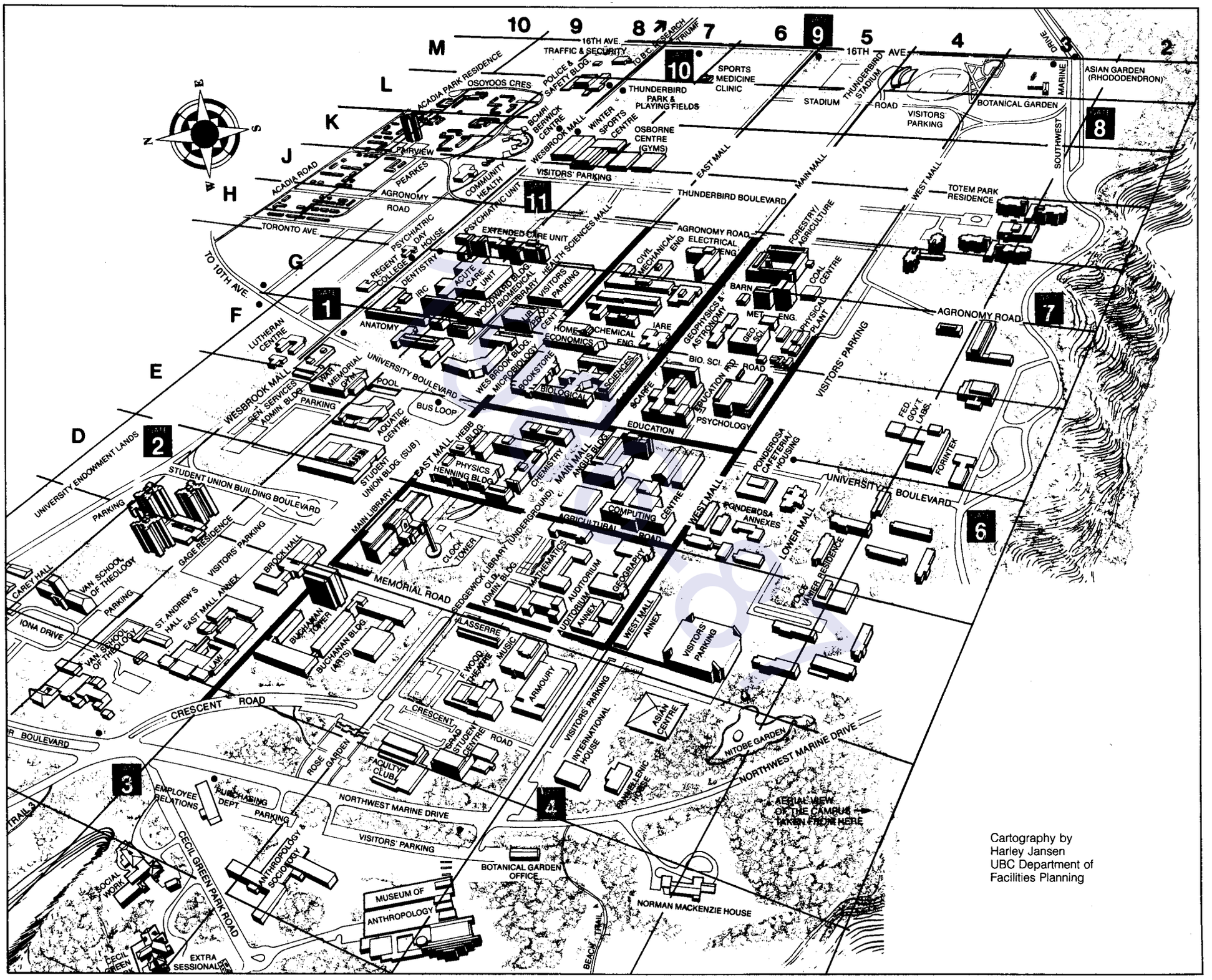

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