1990/91 CALENDAR

THE UNIVERSITY OF BRITISH COLUMBIA

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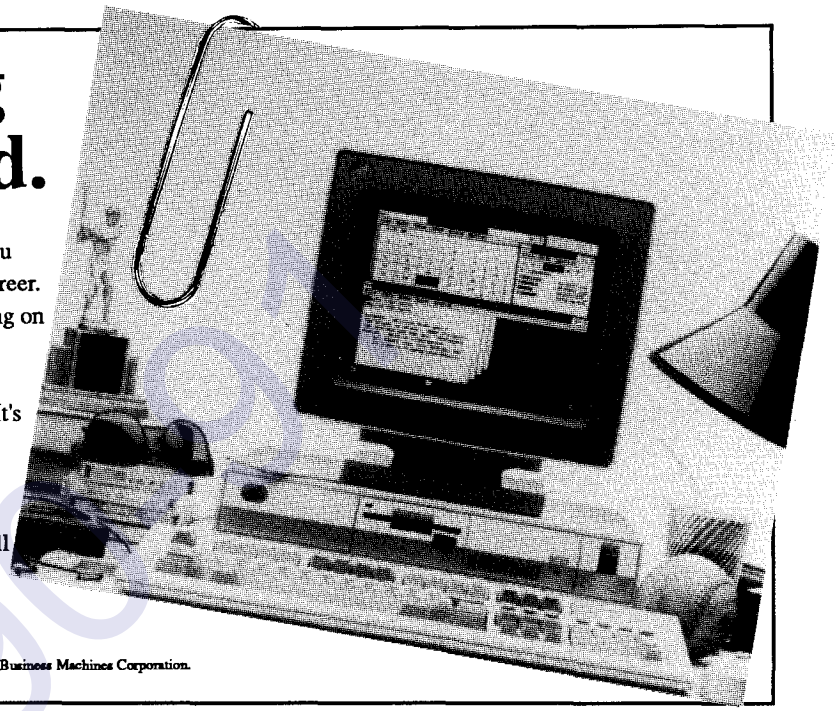

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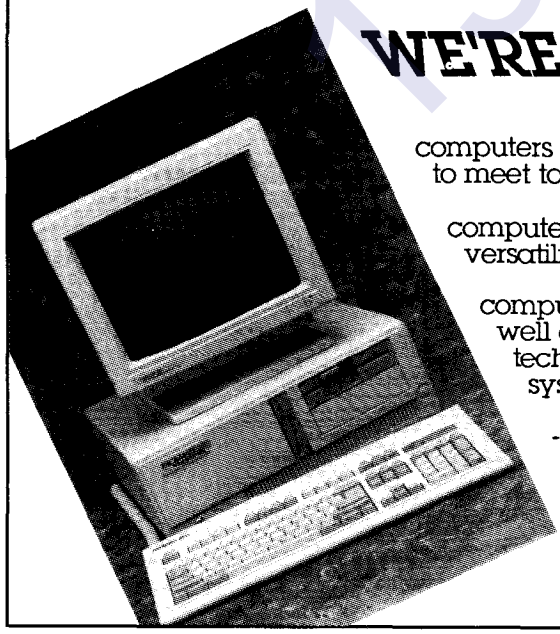

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The University of British Columbia

76th Session

1990-91 Calendar

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APPLICATION DATES FOR FACULTIES AND SCHOOLS FOR 1990-91

The following deadlines apply for new students, for former UBC students not in attendance in the immediately previous Winter Session, and for students transferring from one faculty to another.

Applicants to those Faculties/Schools with deadlines falling on later dates (e.g. June 30) are advised to make application in advance of the published deadlines in order to take advantage of the early registration system (Telereg).

AGRICULTURAL SCIENCES	
B.Sc. (Agr.)	June 30
Landscape Architecture, B.L.A.	April 30*
* (Document deadline July 15)	
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)	
** (Documention deadline July 15)	
ARTS	June 30*
Creative Writing B.F.A.	June 30*
Diploma in Applied Creative Non-Fiction	June 30*
Diploma in Applied Linguistics	June 30*
Diploma in Art History	August 1
Diploma in Film/Television Studies	April 30*
Diploma in French Translation	August 1
Economics Major Program	June 15*
Family and Nutritional Sciences — (B.H.E.)	June 30*
— (B.Sc.(Dietet.))	May 15
Fine Arts B.F.A. Studio Program (Third Year) and Second Year Studio Art Courses	March 31*
International Relations Major Program	May 31
Library, Archival and Information Studies (M.L.S. and M.A.S.)	March 1
Music B.Mus.	April 15*
Social Work — B.S.W. *(undergraduate program)*	February 28
— B.S.W. *(for applicants with B.A. or equivalent degree)*	January 31
Theatre — B.A. (Film/Television)	April 30*
— B.F.A.	April 1*
* (Documentation deadline July 15)	
COMMERCE AND BUSINESS ADMINISTRATION	
B.Com.	May 31*
* (Documentation deadline June 30)	
DENTISTRY *(including application for readmission)*	January 7
EDUCATION *(including transfers from other Faculties)*	May 31*
(Application by March 15 is advisable.)	
Physical Education and Recreation (B.P.E.)	May 31*
Diploma Programs *(early application advisable)*	April 1
* (Documentation deadline June 30)	
FORESTRY	June 30*
* (Documentation deadline July 15)	
GRADUATE STUDIES	
Overseas international applicants	April 30
Canadian and U.S. applicants	May 31
(Please check with department concerned in the event that earlier deadlines may apply)	
LAW	February 1
Application for readmission	June 30
MEDICINE *(including application for readmission)*	January 15*
Audiology and Speech Sciences	March 31
Health Services Planning and Administration	April 30
Health Care and Epidemiology — M.H.Sc.	April 30
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)	
** (Documentation deadline May 31)	
*** (Documentation deadline July 15)	
PHARMACEUTICAL SCIENCES *(including application for readmission and transfers from other Faculties)*	May 31*
* (Documentation deadline June 15)	
SCIENCE	June 30*
* (Documentation deadline July 15)	
INTERNATIONAL UNDERGRADUATE AND GRADUATE APPLICATIONS	April 30*
* (unless earlier date indicated for particular faculty or department)	June 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.*	(unless earlier date indicated above)
SPRING AND SUMMER SESSIONS	April 1
Spring Session — out-of-province new students	April 15
Spring Session — in-province new students	February 28
Spring Session — international students	April 15
Spring Session — readmissions	April 15
Summer Session — out-of-province new students	April 15
Summer Session — in-province new students	February 28
Summer Session — international students	May 15
Summer Session — readmissions	
GUIDED INDEPENDENT STUDY	October 1
— for courses starting in November	December 3
— for courses starting in January	February 1
— for courses starting in March	April 2
— for courses starting in May	June 3
— for courses starting in July	August 1
— for courses starting in September	

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) Contact the department concerned or phone	*228-2848*
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	*228-3820*
Financial Services Department	*228-2454*
Guided Independent Study (Collect, if long distance)	*228-6565*
Student Health Service	*228-7011*
Student Housing	*228-2811*
Language Institute (English as a second language)	*222-5208*
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.

There is now a $3.00 charge for this publication. Mail requests must be accompanied by the following fees (which include postage and handling).

Canada — $6.00
U.S.A — $7.50
Outside Canada (excluding U.S.A.) — $10.00

ACADEMIC YEAR 1990-91

August 1990

1 Wednesday — Last day for applications for Graduation to be submitted to the Registrar by all students expecting to graduate in November.

10 Friday — Graduate Studies — last day for submission of doctoral theses to the Faculty of Graduate Studies for November graduation.

22 Wednesday — Winter Session — deadline for application for deferment of tuition fee payment for Term 1.
Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in September.

26 Sunday — Forestry Interior Field School for Third Year (FRST 351), August 26 - September 1 inclusive.

27 Monday — Agricultural Sciences Field Trip (AGSC 300). August 27-31 inclusive.
Community and Regional Planning — First Year Orientation Seminar and Omnibus Course, August 27 - September 5 inclusive.
Dentistry — all years — orientation begins.
Forestry Survey School (FORH 263). August 27-31 inclusive, plus five successive Saturdays during term.
Mining and Mineral Process Engineering Field Trip for Fourth Year (MMPE 492), August 27 - September 3 inclusive.

28 Tuesday — Medicine — First Year registration.

29 Wednesday — Master of Business Administration 'Orientation Seminar'; August 29-31 inclusive.
Dentistry — classes begin all years.
Law — classes begin all years including LL.M. program.
Medicine — First Year classes begin.

31 Friday — AMS New Student Retreat, August 31 - September 2 inclusive.
Graduate Studies — last day for completion of Master's or Doctoral program requirements to avoid assessment of next instalment of tuition fees.
Medicine — Second and Third Year registration.

September 1990

1 Saturday — ACADEMIC YEAR 1990-91 begins.
Residence rooms available because of late cancellations will be assigned from this date on to those on the waiting list who are present at the Housing Office to accept and pay for room assignments.

3 Monday — Labour Day. University closed. **Telereg** closed.

4 Tuesday — Classes begin for Winter Session day and evening courses for all faculties not already in session.
Late Registration begins, Winter Session.
Medicine — Second and Third Years — first day of classes.

5 Wednesday — Last day for payment of first instalment of fees for registration and course changes made on or before Tuesday, September 4. If payment is not made by this date, registration in all courses will be terminated (unless a deferment has been granted — see **Telereg** Guide for details). Students may re-register by **Telereg** until Friday, September 21, subject to course availability. Fees are due immediately on re-registration.

7 Friday — Graduate Studies — last day for submission to most departments of Master's degree theses in final form for November graduation.
Guided Independent Study — course start date — last date for in-person registration for courses starting in September.
Community and Regional Planning Field Camp, September 7-9 (inclusive).

8 Saturday — **Telereg** closed September 8 and 9.

12 Wednesday — Meeting of the Senate.

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

18 Tuesday — Last date for changes in registration and for withdrawal from a Term 1 course without withdrawal standing of "W" recorded on transcript.

20 Thursday — English Composition Test for all students with credit for English 100 or its transfer equivalent.

21 Friday — Last date for changes in registration and for withdrawal from a two-term course without withdrawal standing of "W" recorded on transcript.
Last day for late registration and course changes through **Telereg**. A late registration fee of $50.00 will be charged for registration or re-registration after this date.
Last day for completion of Bachelor's degree program requirements for graduation in November.

25 Tuesday — Last day for payment of tuition fees for any courses added between September 4 and 21. Registration will be cancelled without notice if fees are not paid in full by this date. Reinstatement after this date requires payment of a reinstatement fee in addition to all other outstanding fees.
Graduate Studies — last day for completion of Master's or Doctoral program requirements to avoid assessment of next instalment of tuition fees.
Graduate Studies — last day for payment of September instalment of tuition fees. Registration will be cancelled without notice if fees are not paid in full by this date. Reinstatement after this date requires payment of a reinstatement fee in addition to all other outstanding fees.

27 Thursday — 75th Anniversary Homecoming Week (September 27 - October 3). Fall Ceremony for Honorary Degrees and Scholarship recognition.

October 1990

1 Monday — 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.

8 Monday — Thanksgiving Day. University closed.

10 Wednesday — Last day for submission of applications for supplemental and deferred examinations from Spring and Summer Sessions.
Meeting of the Senate.

12 Friday — Last date for withdrawal from a Term 1 course with withdrawal standing of "W" recorded on transcript.
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.

22 Monday — Guided Independent Study — Last date for Registrar's Office to receive registration by mail for courses starting in November.

November 1990

1 Thursday — Guided Independent Study — Course start date. Last date for in-person registration.

5 Monday — Rehabilitation Medicine — Fourth Year — Clinical Fieldwork begins for Occupational Therapy and Physical Therapy students (ends December 14).

9 Friday — University closed in lieu of Remembrance Day.

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

14 Wednesday — Meeting of the Senate.

23 Friday — Last date for withdrawal from a two-term course with withdrawal standing of "W" recorded on transcript.

29 Thursday — Special 75th Anniversary Congregation for conferring Honorary Degrees and Degrees in Course, 2:30 p.m., War Memorial Gymnasium.

30 Friday — Graduate Studies — last day for submission to the Faculty of Graduate Studies of I.W. Killam Memorial Postdoctoral Fellowship applications.
Last day of classes for most faculties scheduling formal Christmas examinations.

December 1990

3 Monday — **Telereg** opens for Term 2 registration and course changes.
Supplemental and Deferred examinations, Spring and Summer Sessions only.

4 Tuesday — Christmas examinations begin most faculties, day and evening classes.
English Composition Test scheduled for the first week of examinations. Consult posted examination schedule for time.

6 Thursday — Deadline for application for deferment of tuition fee payment for Term 2 for new and returning students not registered in Term 1.

7 Friday — Dentistry — First Year — last day of Dental classes, Medical classes continue.
Dentistry — Second, Third and Fourth Years, last day of Dental classes, Medical classes continue.
Medicine — First Year — mid-term examinations, December 7-14.

10 Monday — Dentistry — all years — examination period begins.
Medicine — Second Year — Christmas examinations (December 12-14).

12 Wednesday — Meeting of the Senate.

14 Friday — Medicine — First and Fourth Years — last day of classes.

19 Wednesday — **Telereg** closes for Term 2 registration and course changes.

20 Thursday — Last day of Christmas examinations for most faculties.
First term ends, Winter Session.

21 Friday — Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in January.
Medicine — Second and Third Years — last day of classes.

25 Tuesday — Christmas Day. University closed.

26 Wednesday — Boxing Day. University closed.

31 Monday — 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.
Graduate Studies — last day for completion of Master's or Doctoral program requirements to avoid assessment of next instalment of tuition fees.

January 1991

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

2 Wednesday — Dentistry — all years — classes begin.
Medicine — First, Second and Third Years — classes begin.
Medicine — Fourth Year — Clinical Rotations begin.

4 Friday — Education Abroad Programs — last day for applications to be submitted to the International Liaison Office for the following programs:
University of California
University of Copehagen
Ritsumeikan University
Exchange Programs — Last day for applications to be submitted to the International Liaison Office for the following programs:
University of Tsukuba
Zhongshan University

7 Monday — Second term begins, Winter Session — all faculties, day and evening classes.
Telereg opens for Term 2 late registration and course changes.
Graduate Studies — students wishing to be considered for University Graduate Fellowships should contact the department concerned as soon as possible after January 7.
Guided Independent Study — course start date. Last date for in-person registration.

16 Wednesday — Meeting of the Senate.

21 Monday — Education — Term 2 extended practicum begins for secondary teaching programs (January 21 - April 26).
Last date for changes in registration and for withdrawal from a Term 2 course without withdrawal standing of "W" recorded on transcript.
Last day for late registration and course changes through **Telereg** for Term 2. A late registration fee of $50.00 will be charged for registration or re-registration after this date.

22 Tuesday — Last date for payment of outstanding balance of tuition fees for Winter Session including payment of Term 2 courses and of second instalment of tuition fees for continuing students. Registration will be cancelled without notice if fees are not paid in full by this date. Reinstatement after this date requires payment of a reinstatement fee in addition to all other outstanding fees.
Graduate Studies — last day for completion of Master's or Doctoral program requirements to avoid assessment of next instalment of tuition fees.
Graduate Studies — last day for payment of January instalment of tuition fees. Registration will be cancelled without notice if fees are not paid in full by this date. Reinstatement after this date requires payment of a reinstatement fee in addition to all other outstanding fees.

February 1991

1 Friday — Graduate Studies — last day for departments to submit applications for University Graduate Fellowships on behalf of students.
Faculty textbook adoptions required by Bookstore for courses beginning in May.

15 Friday — Last date for withdrawal from a Term 2 course with withdrawal standing of "W" recorded on transcript.
B.C. Student Assistance Program — last day for applications and appeals for 1990-91 Winter Session. (Subject to change.)
Deadline for Applications for Graduation to be submitted to the Registrar by all students expecting to graduate in May.

20 Wednesday — Meeting of the Senate.

21 Thursday — Mid-term break most faculties, February 21 and 22. Lectures and laboratories cancelled. Library and other facilities open.

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

25 Monday — Rehabilitation Medicine — Fourth Year — Final Clinical Fieldwork begins for Occupational Therapy and Physical Therapy students (ends April 18).

March 1991

1 Friday — Faculty textbook adoptions required by Bookstore for courses beginning in July.
First day that Residence Applications are accepted. (Applications received by mail prior to this date will be dated March 1.)
Guided Independent Study — course start date. Last date for in-person registration.

2 Friday — Graduate Studies — last day for submission of doctoral theses to the Faculty of Graduate Studies for Spring graduation.

7 Thursday — Faculty Association Annual Meeting, 1:00 p.m.

8 Friday — Dentistry — First Year, last day of classes, end of Phase I.
Medicine — First Year, end of Phase I.

11 Monday — Dentistry and Medicine — First Year, study period (March 11-14).

15 Friday — Dentistry and Medicine — First Year examinations (March 15-22).
English Composition Test for all undergraduates.

18 Monday — Spring and Summer Sessions — **Telereg** opens for registration.

20 Wednesday — Meeting of the Senate.

22 Friday — Medicine — Third Year — last day of classes.

25 Monday — Dentistry and Medicine — First Year vacation week (March 25-28).
Medicine — Third Year — Examination Week.

28 Thursday — Faculty textbook adoptions required by Bookstore for courses beginning in September.
Graduate Studies — last day for submission to most departments of Master's degree theses in final form for Spring graduation.

29 Friday — Good Friday. University closed.

April 1991

1 Monday — Easter Monday. University closed.

2 Tuesday — Last day for submission of graduating essays and theses, most Bachelor degree programs.
Dentistry — First Year, beginning of Phase II.
Medicine — First Year, beginning of Phase II.
— Third Year, elective block begins (April 2-26).

5 Friday — Last day of classes for most faculties.
Dentistry — Third and Fourth Year, last day of classes.
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.

9 Tuesday — Sessional examinations begin (day and evening classes), most faculties.
Dentistry — Fourth Year, examinations begin.

15 Monday — Deadline for application for entrance scholarships for students enrolling at UBC from Grade 12.

17 Wednesday — Deadline for application for deferment of tuition fee payment for Spring Session.

19 Friday — Dentistry — Second Year — last day of classes.
Dentistry — Third Year — last day of Dental clinics.

22 Monday — Forestry — Third-Year students begin 18-day Field Work at the University Research Forest, Maple Ridge, B.C. (FRST 451).
Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in May.

23 Tuesday — Dentistry — Third Year — examinations begin.

24 Wednesday — Meeting of the Senate.

26 Friday — Dentistry — Second Year — examinations begin.
Medicine — Third Year ends.

27 Saturday — Geography — Third-Year students begin Field School (GEOG 309).

30 Tuesday — Sessional examinations end, most faculties.
Second term ends, Winter Session, most faculties.
Civil Engineering Surveying Field School begins (CIVL 235) — students must register for this course in Department of Civil Engineering between April 2 and 11.
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.

30 Tuesday — Graduate Studies — last day for completion of Master's or Doctoral program requirements to avoid assessment of next instalment of tuition fees.
Telereg closes for Spring registration.

May 1991

1 Wednesday — 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.
Geological Sciences — Third Year students begin Field School (GEOL 335).
Graduate Studies — last day for departments to submit applications for University Graduate Fellowships in Late Competition on behalf of students not currently registered at UBC.
Guided Independent Study — course start date. Last day for in-person registration.
Spring Session — Tuition fees due.

3 Friday — Medicine — Second and Fourth Year, last day of classes.

5 Sunday — Spring Session Residence rooms available for students with prepaid assignments. Spring Session students requiring accommodation prior to this date should contact the Housing Office.

6 Monday — Spring Session credit courses, first day of classes. (Term 1, May 6 - June 14; Term 2, June 17 - July 26)
Spring Session — **Telereg** opens for late registration and course changes.
Medicine — Second Year study period (May 6-9).
Rehabilitation Medicine — Second and Third Year — Clinical Fieldwork begins for Occupational Therapy and Physical Therapy students.

10 Friday — Dentistry and Medicine — First Year, last day of classes.
Medicine — Second Year examinations begin (May 10-17).

13 Monday — Dentistry and Medicine — First Year, Final Examinations (May 13-17).
Medicine — Fourth Year, 1991-92 session begins (May 13, 1991 - May 17, 1992). (M.S.I. inter-departmental course begins.)

14 Tuesday — Education — Term 3 classes begin for secondary teaching program (May 14 - August 10).

15 Wednesday — 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 by students entering UBC from other post-secondary institutions, or returning to UBC after a year or more of absence.

17 Friday — Spring Session — last day for late registration and course changes through **Telereg**.

20 Monday — Victoria Day. University closed.
Medicine — Fourth Year — 1991-92 Clinical Rotations begin.

22 Wednesday — Meeting of the Senate.
Graduate Studies — last day for completion of Master's or Doctoral program requirements to avoid assessment of next instalment of tuition fees.
Graduate Studies — last day for payment of May instalment of tuition fees. Registration will be cancelled without notice if fees are not paid in full by this date. Reinstatement after this date requires payment of a reinstatement fee in addition to all other outstanding fees.

27 Monday — Baccalaureate Service, 8:00 p.m.

28 Tuesday — Annual Congregation for conferring of degrees, War Memorial Gymnasium.

29 Wednesday — Annual Congregation for conferring of degrees, War Memorial Gymnasium.

30	Thursday	Annual Congregation for conferring of degrees, War Memorial Gymnasium.
31	Friday	Annual Congregation for conferring of degrees, War Memorial Gymnasium.

June 1991

14	Friday	Deadline for application for deferment of tuition fee payment for Summer Session. Graduate Studies — last day for Faculty of Graduate Studies to receive recommendations from departments for overseas international students to be admitted in September.
17	Monday	Spring and Summer Sessions — last day for submission of applications for Scholarships and Bursaries.
21	Friday	Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in July. Spring and Summer Session — last day for B.C. Student Assistance Program applications for 1991. (Subject to change.)
25	Tuesday	Summer Session — **Telereg** closes for registration.
26	Wednesday	Summer Session — Tuition due date.
28	Friday	Last day for "early" submission of applications for B.C. STUDENT ASSISTANCE PROGRAM (B.C. and Canada Student Loans) for 1991-92 Winter Session. Students applying after this date may not receive funds by the commencement of the term and may be disqualified for deferments and emergency loans.

July 1991

1	Monday	Canada Day. University closed. Summer Session Residence rooms available for those with prepaid assignments.
2	Tuesday	Summer Session — **Telereg** opens for late registration and course changes. Last day for submission of applications for supplemental and deferred examinations from previous Winter Session. Guided Independent Study — course start date. Last day for in-person registration. Summer Session classes begin most courses. Term 1, July 2-19; Term 2, July 22 - August 10 for most courses.
5	Friday	Summer Session — last day for late registration and courses changes through **Telereg**.
26	Friday	Spring Session evening credit courses, lectures and examinations in all courses completed by this date. Supplemental and Deferred examination period (Winter Session), July 26 - August 2.
31	Wednesday	Graduate Studies — last day for Faculty of Graduate Studies to receive files from departments on students accepted for registration in September. Medicine and Dentistry — Supplemental examinations, July 31 - August 2.

August 1991

5	Monday	B.C. Day. University closed.
9	Friday	Summer Session classes end — most courses. Education — last day of classes for Term 3 of secondary teaching program.
10	Saturday	Summer Session examinations — most courses. Education — Term 3 examinations for secondary teaching program.
15	Thursday	Last day for Applications for Graduation to be submitted to the Registrar by all students expecting to graduate in November. Graduate Studies — last day for submission of doctoral theses to the Faculty of Graduate Studies for November graduation. Summer Session classes end for seven-week courses.
16	Friday	Summer Session examinations for seven-week courses.
22	Thursday	Guided Independent Study — last day for Registrar's Office to receive registration by mail for courses starting in September.
23	Friday	Winter Session 1992-93 — deadline for application of deferment of tuition fee payment for Term 1.
25	Sunday	Forestry Interior Field School for Third Year (FRST 351), August 25-31 inclusive.
26	Monday	Forestry Survey School (FORH 263), August 26-30 inclusive, plus five successive Saturdays during term.
29	Thursday	Master of Business Administration — Orientation Seminar August 29-31.
30	Friday	Graduate Studies — last day for completion of Master's or Doctoral program requirements to avoid assessment of next instalment of tuition fees.
31	Saturday	ACADEMIC YEAR ENDS.

Note: Offices are closed Saturdays.

THE UNIVERSITY OF BRITISH COLUMBIA

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R. W. BURLING, Professor Emeritus of Oceanography (1986).
K. O. L. BURRIDGE, Professor Emeritus of Anthropology and Sociology (1988).
A. M. BUTLER, Assistant Professor Emerita of Nursing (1988).
J. H. CALAM, Professor Emeritus of Social and Educational Studies (1985).
K. CAMBON, Clinical Professor Emeritus of Surgery (1988).
D. J. CAMPBELL, Professor Emeritus of Pathology (1990).
J. J. R. CAMPBELL, Professor Emeritus of Microbiology (1983).
M. A. CAMPBELL, Professor Emerita of Nursing (1988).
P. READ CAMPBELL, Associate Professor Emerita of Education (1972).
P. CAPELLE, Associate Professor Emerita of Nursing (1971).
D. D. CASPERSEN, Assistant Professor Emeritus of Mathematics and Science Education (1987).
J. H. CATTERSON, Professor Emerita of Language Education (1989).
H. E. CAWSTON, Associate Professor Emerita of Nursing (1982).
F.-C. CHANG, Professor Emeritus of Asian Studies (1973).
C.-Y. CHAO, Professor Emerita of Asian Studies (1990).
J. D. CHAPMAN, Professor Emeritus of Geography (1989).
E. CHAVE, Assistant Professor Emerita of Social Work (1974).
D. H. CHITTY, Professor Emeritus of Zoology (1978).
R. R. CHRISTIAN, Associate Professor Emeritus of Mathematics (1990).
W. B. CHUNG, Professor Emeritus of Surgery (1989).
R. M. CLARK, Professor Emeritus of Economics (1985).
B. R. CLARKE, Professor Emeritus of Educational Psychology and Special Education (1987).
W. H. COCKROFT, Clinical Associate Professor Emeritus of Medical Microbiology and Pathology (1976).
W. COHN, Professor Emeritus of Anthropology & Sociology (1986).
M. L. H. COLBECK, Associate Professor Emerita of English (1966).
K. COLE, Professor Emerita of Botany (1987).
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).
J. COULTHARD ADAMS, Senior Instructor Emerita of Music (1973).
H. M. COVELL, Professor Emeritus of Education (1978).
R. J. COWAN, Clinical Professor Emeritus of Surgery (1986).
R. C. CRAGG, Professor Emeritus of the Fine Arts (1970).
C. F. CRAMER, Associate Professor Emeritus of Physiology (1987).
A. O. J. CRICHTON, Professor Emerita of Health Care and Epidemiology (1985).
E. P. CRICHTON, Clinical Associate Professor Emerita of Pathology (1989).
J. U. CRICHTON, Professor Emeritus of Paediatrics (1987).
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).
D. DALLAS, Professor Emerita of French (1967).
W. R. DANNER, Professor Emeritus of Geological Sciences (1989).
C. G. DAVID, Professor Emerita of Educational Psychology and Special Education. (1985).
L. DAVIES, Clinical Instructor Emerita of Anaesthesia (1988).
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).
R. E. DELAVAULT, Associate Professor Emeritus of Geological Sciences (1973).
D. DERRY, Professor Emeritus of Mathematics (1974).
J. DICK, Clinical Associate Professor Emeritus of Medicine (1987).
C. E. DOLMAN, Professor Emeritus of Microbiology (1971).
C. L. DOLMAN, Clinical Professor Emerita of Pathology (1987).
P. DOW, Professor Emeritus of Oral Medical and Surgical Sciences (1988).
G. E. DOWER, Associate Professor Emeritus of Pharmacology and Therapeutics (1989).
L. DOWNEY, Professor Emeritus of Administrative, Adult and Higher Education (1987).
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).
W. L. DUNN, Professor Emeritus of Pathology (1987).
G. H. DURRANT, Professor Emeritus of English (1981).
G. G. S. DUTTON, Professor Emeritus of Chemistry (1988).
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).
N. EPSTEIN, Professor Emeritus of Chemical Engineering (1989).
A. L. FARLEY, Professor Emeritus of Geography (1986).
J. FERGUSON, Assistant Professor Emerita of Education (1977).
E. G. FIEDLER, Assistant Professor Emeritus of Educational Psychology and Special Education (1988).
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).
J. FOORT, Senior Instructor Emeritus of Orthopaedics (1987).
D. K. FORD, Professor Emeritus of Medicine (1989).
M. FORSTER, Assistant Professor Emerita of Mathematics and Science Education (1987).
M. I. FOSTER, Professor Emeritus of Visual and Performing Arts in Education (1989).
J. G. FOULKS, Professor Emeritus of Pharmacology (1987).
I. K. FOX, Professor Emeritus of Community and Regional Planning (1982).
G. H. FRANCIS, Clinical Associate Professor Emeritus of Surgery (1978).
L. B. FRATKIN, Clinical Associate Professor Emeritus of Surgery (1986).
C. L. FRIEDMAN, Associate Professor Emerita of Anatomy (1986).
S. M. FRIEDMAN, Professor Emeritus of Anatomy (1985).
D. C. FROST, Professor Emeritus of Chemistry (1989).
A. M. FURNESS, Associate Professor Emerita of Social Work (1988).
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).
W. H. GILBERT, Associate Professor Emeritus of Fine Arts (1986).
M. GILROY, Associate Professor Emerita of Librarianship (1978).
P. GOFTON, Clinical Professor Emeritus of Medicine (1987).
T. GOLDBERG, Professor Emeritus of Visual and Performing Arts (1987).
A. M. GOODEVE, Assistant Professor Emeritus of Pharmaceutical Sciences (1986).
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).
R. H. GOURLAY, Clinical Professor Emeritus of Surgery (1987).
J. I. GOW, Assistant Professor Emerita of History (1989).
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).
P. GRAY, Lecturer Emerita of Education (1989).
R. F. GRAY, Professor Emeritus of Mathematics and Science Education (1985).
F. M. GREENWOOD, Associate Professor Emeritus of History (1988).
H. J. GREENWOOD, Professor Emeritus of Geological Sciences (1990).
R. J. GREGG, Professor Emeritus of Linguistics (1978).
B. G. GRIFFITH, Professor Emeritus of Forestry (1967).
G. M. GRIFFITHS, Professor Emeritus of Physics (1989).
E. V. GRILL, Associate Professor Emeritus of Oceanography (1988).
F. J. GROVER, Professor Emeritus of French (1985).
S. GRZYBOWSKI, Professor Emeritus of Medicine (1985).
D. T. GUEST, Associate Professor Emeritus of Social Work (1989).
A. M. GUNN, Professor Emeritus of Social and Educational Studies (1985).
P. G. HADDOCK, Professor Emeritus of Forestry (1978).
P. HAHN, Professor Emeritus of Obstetrics and Gynaecology (1989).
W. F. HALL, Professor Emeritus of English (1990).
J. E. HALLIDAY, Professor Emeritus of Pharmaceutical Sciences (1977).
F. C. HARDWICK, Professor Emeritus of Education (1972).
A. HARDYMENT, Clinical Professor Emeritus of Paediatrics (1980).
R. HARLOW, Professor Emeritus of Creative Writing (1989).
T. R. HARMON, Clinical Associate Professor Emeritus of Pathology (1979).
B. HARRISON, Professor Emeritus of History (1974).
R. C. HARRISON, Professor Emeritus of Surgery (1987).
T. J. HARROP, Professor Emeritus of Clinical Dental Sciences (1989).
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).
A. HERSTEIN, Clinical Assistant Professor Emeritus of Obstetrics and Gynaecology (1989).
V. O. HERTZMAN, Clinical Professor Emeritus of Medicine (1985).
R. H. HEYWOOD, Professor Emeritus of Commerce and Business Administration (1975).
M. A. HILL, Associate Professor Emerita of Social Work (1986).
J. HINGSTON, Clinical Professor Emeritus of Paediatrics (1986).
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).
R. F. HOOLEY, Professor Emeritus of Civil Engineering (1990).
V. G. HOPWOOD, Associate Professor Emeritus of English (1984).
G. M. HOUGHAM, Professor Emeritus of Social Work (1986).
B. HOWARD, Assistant Professor Emerita of Physics (1988).
J. F. HOWES, Professor Emeritus of Asian Studies (1989).
W. J. HUDSON, Associate Professor Emerita of Rehabilitation Medicine (1988).
F. W. B. HURLBURT, Clinical Professor Emeritus of Medicine (1982).
L. N. HURVITZ, Professor Emeritus of Asian Studies (1989).
E. J. HYDE, Assistant Professor Emeritus of Preventive and Community Dentistry (1985).
K. HYDE, Associate Professor Emerita of Nursing (1988).
L. G. JAHNKE, Professor Emeritus of Law (1987).
A. JAKUBOVIC, Associate Professor Emeritus of Psychiatry (1989).
D. G. L. JAMES, Professor Emeritus of Chemistry (1990).
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).
R. M. JORDAN, Professor Emeritus of English (1989).
F. A. KAEMPFFER, Professor Emeritus of Physics (1986).
D. C. KENDALL, Professor Emeritus of Educational Psychology and Special Education (1988).
R. B. KERR, Professor Emeritus of Medicine (1974).
L. R. KERSEY, Associate Professor Emeritus of Electrical Engineering (1980).
S. L. KHANNA, Assistant Professor Emeritus of Clinical Dental Sciences (1989).
M. KLIMAN, Clinical Associate Professor Emeritus of Surgery (1990).
C. KLINE, Clinical Associate Professor Emeritus of Psychiatry (1983).
H. KLONOFF, Professor Emeritus of Psychiatry (1990).
F. KNOBLOCH, Professor Emeritus of Psychiatry (1982).
G. KNOX, Professor Emeritus of Fine Arts (1987).
H. C. KNUTSON, Professor Emeritus of French (1988).
S. KORT, Program Director Emeritus (1990).
L. KRAINTZ, Professor Emeritus of Oral Biology (1987).
V. J. KRAJINA, Professor Emeritus of Botany (1982).
W. KRAYENHOFF, Associate Professor Emeritus of Mathematics and Science Education (1983).
H. KRIVEL, Clinical Professor Emeritus of Paediatrics (1986).
R. E. KUCERA, Associate Professor Emeritus of Geological Sciences (1987).
A. B. LAITHWAITE, Associate Professor Emeritus of Physical Education and Recreation (1980).
F. C. LANGDON, Professor Emeritus of Political Science (1984).
W. S. LANNING, Associate Professor Emeritus of Education (1972).
P. A. LARKIN, University Professor Emeritus (1990).
J. C. LAWRENCE, Assistant Professor Emeritus of History (1983).
C. S. C. LEAR, Professor Emeritus of Clinical Dental Sciences (1990).
R. J. LEDUC, Associate Professor Emeritus of Mathematics and Science Education (1987).
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).
R. C. LEWIS, Associate Professor Emeritus of Mathematics and Science Education (1986).
C. LI, Professor Emerita of Asian Studies (1970).
T. Y. LIN, Professor Emeritus of Psychiatry (1986).
W.-C. LIN, Professor Emeritus of Chemistry (1980).
D. A. LINDQUIST, Senior Instructor Emeritus of Physics (1988).
C. C. LINDSEY, Professor Emeritus of Zoology (1988).
H. V. LIVERMORE, Professor Emeritus of Hispanic and Italian Studies (1981).
A. F. LIVESEY, Senior Instructor Emerita of English (1981).
D. LIVINGSTONE, Assistant Professor Emerita of Visual and Performing Arts in Education (1988).
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).
A. L. D. MacDONELL, Program Director Emeritus (1990).
M. MACFARLANE, Program Director Emerita (1990).
M. E. MacFARLANE, Associate Professor Emerita of Home Economics (1967).
J. R. MacKAY, Professor Emeritus of Geography (1981).
V. A. MACKAY, Associate Professor Emerita of Education (1979).
H. M. MacKENZIE, Associate Professor Emerita of Education (1973).
C. J. G. MacKENZIE, Professor Emeritus of Health Care and Epidemiology (1986).
S. MADDIN, Clinical Professor Emeritus of Medicine (1987).
H. E. MALLORY, Professor Emerita of Nursing (1967).
K. C. MANN, Professor Emeritus of Physics (1981).
M. A. MANZALAOUI, Professor Emeritus of English (1989).
J. C. T. MAO, Professor Emeritus of Commerce and Business Administration (1988).
B. E. MARCH, Professor Emerita of Animal Science (1986).
E. L. MARGETTS, Professor Emeritus of Psychiatry (1985).
A. W. MARSHALL, Professor Emeritus of Statistics (1987).
R. H. MARSHALL, Clinical Associate Professor Emeritus of Surgery (1987).
W. H. MATHEWS, Professor Emeritus of Geological Sciences (1984).
R. V. MATTESSICH, Professor Emeritus of Commerce and Business Administration (1988).
R. 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).
E. McGEER, Professor Emerita of Psychiatry (1989).
B. L. McGREGOR, Assistant Professor Emerita of Rehabilitation Medicine (1986).
H. W. McINTOSH, Professor Emeritus of Medicine (1985).
A. D. McKENZIE, Clinical Professor Emeritus of Surgery (1983).
T. D. McKIE, Professor Emeritus of Educational Psychology and Special Education (1988).
F. E. McNAIR, Clinical Assistant Professor Emeritus of Psychiatry (1984).
J. A. McNEELY, Associate Professor Emeritus of Germanic Studies (1987).
C. McNIVEN, Associate Professor Emerita of Social Work (1989).
J. 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).
R. F. MERRIAM, Assistant Professor Emeritus of Mathematics and Science Education (1987).
W. E. MESSENGER, Associate Professor Emeritus of English (1988).
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).
F. MIRHADY, Clinical Professor Emeritus of Paediatrics (1988).
C. L. MITCHELL, Professor Emeritus of Commerce and Business Administration (1986).
H. MITCHELL, Professor Emeritus of History (1989).
J. R. MITCHELL, Associate Professor of Physical Education and Recreation (1987).
V. F. MITCHELL, Professor Emeritus of Commerce and Business Administration (1988).
L. G. MITTEN, Professor Emeritus of Commerce and Business Administration (1986).
J. MOGAN, Assistant Professor Emerita of Nursing (1990).
J. G. MOIR, Assistant Professor Emeritus of Pharmaceutical Sciences (1988).
P. J. MOLONEY, Associate Professor Emeritus of Surgery (1988).
P. MONTGOMERY, Associate Professor Emerita of Educational Psychology and Special Education (1987).
P. R. MOODY, Assistant Professor Emeritus of Physical Education (1989).
A. D. MOORE, Professor Emeritus of Electrical Engineering (1988).
A. M. MOORE, Professor Emeritus of Economics (1984).
M. M. MOREHART, Associate Professor Emerita of Fine Arts (1989).
J. MORISON, Assistant Professor Emeritus of Family Practice (1988).
R. B. MORRIS, Professor Emeritus of Music (1986).
E. MORRISON, Professor Emeritus of English (1970).
F. A. MORRISON, Professor Emeritus of Pharmaceutical Sciences (1983).
M. MORTON, Senior Instructor Emeritus of English (1987).
B. B. MOSCOVICH, Clinical Associate Professor Emeritus of Medicine (1977).
B. N. MOYLS, Professor Emeritus of Mathematics (1984).
M. MULLINGER, Associate Professor Emerita of Paediatrics (1987).
P. M. MULLINS, Associate Professor Emeritus of Physical Education and Recreation (1986).
W. J. MULLINS, Associate Professor Emeritus of Philosophy (1986).
R. MURATORIO-POSSE, Senior Instructor Emeritus of Anthropology and Sociology (1989).
D. C. MURDOCH, Professor Emeritus of Mathematics (1977).
F. E. MURRAY, Professor Emeritus of Chemical Engineering (1984).
J. S. MURRAY, Associate Professor Emeritus of Visual and Performing Arts (1987).
J. E. MUSGROVE, Clinical Associate Professor Emeritus of Surgery (1982).
S. D. NALEVYKIN, Assistant Professor Emerita of Education (1987).
S. W. NASH, Professor Emeritus of Mathematics (1981).
J. W. NEILL, Professor Emeritus of Plant Science (1981).
P. M. NERLAND, Clinical Associate Professor Emeritus of Health Care and Epidemiology (1987).
M. B. NEVISON, Professor Emerita of Education (1982).
F. S. NEWBY, Assistant Professor Emeritus of English (1979).
H. NICHOL, Associate Professor Emeritus of Psychiatry (1990).
C. G. W. NICHOLLS, Professor Emeritus of Religious Studies (1987).
W. NICHOLLS, Professor Emeritus of Social Work (1986).
D. J. NIEDERAUER, Professor Emeritus of French (1987).
J. E. NIXON, Clinical Associate Professor Emeritus of Anaesthesia (1988).
R. L. NOBLE, Professor Emeritus of Physiology (1977).
R. A. NODWELL, Professor Emeritus of Physics (1984).
H. C. NORDAN, Associate Professor Emeritus of Zoology (1988).
S. M. OBERG, Professor Emeritus of Commerce and Business Administration (1988).
H. P. OBERLANDER, Professor Emeritus of Community and Regional Planning (1988).
A. L. OGILVIE, Professor Emeritus of Oral Medicine (1986).
A. H. OHANJANIAN, Senior Instructor Emeritus of Slavonic Studies (1988).
O. A. OLDRIDGE, Professor Emeritus of Educational Psychology and Special Education (1989).
W. OPECHOWSKI, Professor Emeritus of Physics (1985).
M. A. ORMSBY, Professor Emerita of History (1974).
J. A. OSBORNE, Clinical Professor Emeritus of Medicine (1987).
R. F. OSBORNE, Professor Emeritus of Physical Education (1978).
N. L. PADDOCK, Professor Emeritus of Chemistry (1983).
B. F. PAIGE, Clinical Professor Emeritus of Medicine (1987).
G. J. PARFITT, Professor Emeritus of Oral Medicine (1975).
G. V. PARKINSON, Professor Emeritus of Mechanical Engineering (1990).
R. PARKINSON, Clinical Associate Professor Emeritus of Psychiatry (1988).
A. V. PARMINTER, Assistant Professor Emeritus of Education (1982).
F. P. PATTERSON, Professor Emeritus of Surgery (1981).
J. L. PAVELICH, Senior Instructor Emerita of English (1987).
R. H. PEARCE, Professor Emeritus of Pathology (1989).
J. E. L. PECK, Professor Emeritus of Computer Science (1984).
P. G. PENNER, Professor Emeritus of Education (1979).
M. E. M. PENNEY, Professor Emerita of Physical Education (1973).
C. D. PENNOCK, Associate Professor Emeritus of Language Education (1987).
S. A. PERKINS, Professor Emeritus of Education (1986).
C. O. PERSON, Professor Emeritus of Botany (1987).
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).
H.-K. PILTZ, Professor Emeritus of Music (1989).
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).
J. B. POMFRET, Associate Professor Emeritus of Physical Education and Recreation (1988).
M. POMFRET, Assistant Professor Emerita of Physical Education and Recreation (1987).
R. POTASHIN, Assistant Professor Emerita of Psychology (1987).
R. POUTT, Assistant Professor Emeritus of Educational Psychology and Special Education (1989).
M. E. PRANG, Professor Emerita of History (1986).
M. A. PRIMEAU, Associate Professor Emerita of French (1979).
M. H. L. PRYCE, Professor Emeritus of Physics (1984).
D. L. PUGH, Professor Emeritus of Physical Education and Recreation (1987).
E. G. PULLEYBLANK, Professor Emeritus of Asian Studies (1988).
H. M. C. PURKIS, Associate Professor Emerita of French (1984).
M. D. RAINEY, Assistant Professor Emeritus of Language Education (1989).
H. K. RALSTON, Assistant Professor Emeritus of History (1987).
M. V. RALSTON, Associate Professor Emerita of Language Education (1989).
R. L. RAMSAY, Associate Professor Emeritus of Physical Education and Recreation (1989).
S. E. READ, Professor Emeritus of English (1966).
R. REE, Professor Emeritus of Mathematics (1988).
C. REID, Professor Emeritus of Chemistry (1984).
P. REMNANT, Professor Emeritus of Philosophy (1988).
A. J. RENNEY, Professor Emeritus of Plant Science (1979).
C. S. RENNIE, Clinical Associate Professor Emeritus of Medicine (1982).
G. D. REUBART, Professor Emeritus of Music (1986).
V. REVUTSKY, Associate Professor Emeritus of Slavonic Studies (1976).
A. J. REYNERTSON, Professor Emerita of Theatre (1988).
J. I. RICHARDSON, Assistant Professor Emeritus of Religious Studies (1982).
W. O. RICHMOND, Professor Emeritus of Mechanical Engineering (1973).
W. A. RICHTER, Professor Emeritus of Clinical Dental Sciences (1989).
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).
C. L. N. ROBINSON, Clinical Professor Emeritus of Surgery (1986).
G. C. ROBINSON, Professor Emeritus of Paediatrics (1987).
H. S. ROBINSON, Clinical Professor Emeritus of Medicine (1984).
J. L. ROBINSON, Professor Emeritus of Geography (1984).
R. A. H. ROBSON, Professor Emeritus of Anthropology & Sociology (1986).
A. ROGATNICK, Professor Emeritus of Architecture (1985).

M. W. ROSE, Assistant Professor Emeritus of Visual and Performing Arts in Education (1984).
G. ROSENBLUTH, Professor Emeritus of Economics (1986).
A. ROSENTHAL, Professor Emeritus of Chemistry (1979).
H. ROSENTHAL, Program Director Emeritus (1990).
J. E. ROSS, Clinical Associate Professor Emeritus of Obstetrics and Gynaecology (1982).
S. ROTHSTEIN, Professor Emeritus of Library, Archival and Information Studies (1986).
L. A. ROUSSEAU, Associate Professor Emeritus of Mathematics and Science Education (1987).
R. J. ROWAN, Professor Emeritus of Philosophy (1987).
C. A. ROWLES, Professor Emeritus of Soil Science (1980).
R. H. ROYDHOUSE, Professor Emeritus of Oral Biology (1989).
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).
R. F. SCAGEL, Professor Emeritus of Botany (1986).
M. H. SCHULTZ, Clinical Instructor Emeritus of Anaesthesia (1988).
W. E. SCHWAHN, Associate Professor Emeritus of Education (1981).
C. J. SCHWARZ, Associate Professor Emeritus of Psychiatry (1988).
A. D. SCOTT, Professor Emeritus of Economics (1989).
W. R. F. SEAL, Associate Professor Emeritus of Education (1979).
R. W. SEATON, Associate Professor Emeritus of Architecture (1989).
S. SEGAL, Professor Emeritus of Paediatrics (1985).
M. SHAW, University Professor Emeritus (1989).
R. SHULMAN, Associate Professor Emeritus of Psychiatry (1988).
B. SHUMAN, Clinical Associate Professor Emeritus of Paediatrics (1982).
O. SIMPSON, Assistant Professor Emerita of Nursing (1988).
R. SIMPSON, Clinical Associate Professor Emeritus of Anaesthesiology (1987).
N. R. SINCLAIR, Associate Professor Emerita of Education (1981).
M. SION, Professor Emeritus of Mathematics (1989).
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).
J. M. SMITH, Senior Instructor Emeritus of Mathematics and Science Education (1987).
R. N. SMITH, Professor Emeritus of Education (1979).
J. J. SOLECKI, Associate Professor Emeritus of Slavonic Studies (1984).
D. 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. W. SPITZER, Clinical Professor Emeritus of Pathology (1986).
R. B. SPLANE, Professor Emeritus of Social Work (1982).
J. D. SPOUGE, Professor Emeritus of Oral Medicine (1985).
L. M. STALEY, Professor Emeritus of Bio-Resource Engineering (1988).
W. J. STANKIEWICZ, Professor Emeritus of Political Science (1987).
J. R. STEIN, Professor Emerita of Botany (1987).
M. W. STEINBERG, Professor Emeritus of English (1983).
D. G. STEPHENS, Professor Emeritus of English (1988).
G. H. STEPHENSON, Clinical Associate Professor Emeritus of Psychiatry (1982).
R. STEWART, Professor Emeritus of Chemistry (1989).
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).
S.-C. SUNG, Professor Emeritus of Psychiatry (1990).
P. J. SYKES, Assistant Professor Emeritus of Physics (1984).
O. SZIKLAI, Professor Emeritus of Forest Sciences (1990).
M. TADYCH, Assistant Professor Emerita of Social Work (1986).
W. TALLMAN, Associate Professor Emeritus of English (1987).
E. TEGHTSOONIAN, Professor Emeritus of Metals and Materials Engineering (1988).
J. V. THIRGOOD, Professor Emeritus of Forest Resources Management (1989).
P. THOM, Program Director Emerita (1990).
J. P. W. THOMAS, Clinical Professor Emeritus of Pathology and Medicine (1987).
L. A. J. THOMAS, Associate Professor Emeritus of Fine Arts (1980).
M. THOMPSON, Assistant Professor Emerita of Education (1973).
W. J. THOMPSON, Clinical Professor Emeritus of Surgery (1983).
W. M. THOMPSON, Professor Emeritus of English (1974)
H. A. THURSTON, Associate Professor Emeritus of Mathematics (1987).
J. TONZETICH, Professor Emeritus of Oral Biology (1990).
C. WESLEY TOPPING, Professor Emeritus of Sociology (1954).
G. TOUGAS, Professor Emeritus of French (1984).
G. C. TROWSDALE, Professor Emeritus of Visual and Performing Arts in Education (1988).
M. TURKO, Clinical Associate Professor Emeritus of Obstetrics and Gynaecology (1989).
F. A. TURNBULL, Clinical Associate Professor Emeritus of Surgery (1976).
J. S. TYHURST, Professor Emeritus of Psychiatry (1987).
L. TYHURST, Associate Professor Emerita of Psychiatry (1983).
M. UPRICHARD, Professor Emerita of Nursing (1977)
F. B. VEY, Assistant Professor Emerita of Education (1976).
R. VRBA, Associate Professor Emeritus of Pharmacology and Therapeutics (1990).
J. A. WADA, Professor Emeritus of Psychiatry (1989).
H. G. WADMAN, Clinical Professor Emeritus of Obstetrics and Gynaecology (1987).
A. WALDIE, Clinical Associate Professor Emeritus of Family Practice (1987).
D. E. WALKER, Senior Instructor Emerita of Fine Arts (1986).
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).
L. L. WALTERS, Associate Professor Emeritus of Educational Psychology and Special Education (1989).
M. WALTERS, Clinical Professor Emeritus of Medicine (1987).
H. V. WARREN, Professor Emeritus of Geological Sciences (1973).
J. B. WARREN, Professor Emeritus of Physics (1980).
D. 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).
J. M. WEAKLAND, Associate Professor Emerita of Visual and Performing Arts (1987).
S. A. WEESE, Assistant Professor Emeritus of Theatre (1989).
E. M. WEISGARBER, Professor Emeritus of Music (1985).
W. G. WELLINGTON, Professor Emeritus of Plant Science (1986).
T. I. WESTERMARK, Associate Professor Emeritus of Language Education (1988).
R. B. WHITE, Assistant Professor Emeritus of Educational Psychology and Special Education (1987).
R. L. WHITE, Professor Emerita of French (1989).
L. M. WHITEHEAD, Associate Professor Emeritus of English (1988).
D. M. WHITELAW, Professor Emeritus of Medicine (1978).
R. L. WHITMAN, Clinical Associate Professor Emeritus of Psychiatry (1985).
H. D. WHITTLE, Professor Emeritus of Physical Education and Recreation (1982).
J. WIGOD, Associate Professor Emeritus of English (1987).
D. H. WILLIAMS, Professor Emeritus of Medicine (1974).
L. R. WILLIAMS, Clinical Assistant Professor Emeritus of Surgery (1978).
J. W. WILSON, Professor Emeritus of Harvesting and Wood Science (1990).
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).
K. C. WOODSWORTH, Program Director Emeritus (1990).
L. I. WOOLF, Professor Emeritus of Psychiatry (1984).
D. J. WORT, Professor Emeritus of Botany (1975).
D. J. YEO, Professor Emeritus of Clinical Dental Sciences (1987).
J. T. YOUNG, Professor Emeritus of Education (1976).
M. D. YOUNG, Professor Emeritus of Paediatrics (1978).
Y.-N. 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).
J. ZILBER, Professor Emeritus of Creative Writing (1989).

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 ten schools. Graduate work is offered by the Faculty of Graduate Studies which also includes the School of Community and Regional Planning, the Institutes of Applied Mathematics, Asian Research, International Relations, the Centre for Advanced Technology in Microelectronics, Centre for Human Settlements, Centre for Integrated Computer Systems, 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 Fine Arts (B.F.A.) Master of Arts (M.A.) Master of Fine Arts (M.F.A.) Doctor of Philosophy (Ph.D.)
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 in Planning (M.A. (Planning)) Master of Science in Planning (M.Sc. (Planning)) Doctor of Philosophy (Ph.D.)
Dentistry:	Doctor of Dental Medicine (D.M.D.) Master of Science (M.Sc.) Doctor of Philosophy (Ph.D.)
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.) Bachelor of Science in Dietetics (B.Sc.(Dietet.)) 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.)
Music:	Bachelor of Music (B.Mus.) Master of Music (M.Mus.) Doctor of Musical Arts (D.M.A.)

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 Creative Non-Fiction
Applied Linguistics
Art History
Education
Film/Television Studies
Meteorology
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.Sc. (Dietet.)	turquoise with gold and white twisted cord
B.S.F.	brown with green cord
B.Sc. (Forestry)	brown with a light 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
M.A. (Planning)	University blue with dark green and slate grey
M.Sc. (Planning)	University blue with dark green and white
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 usually begins in early May and continues through July, depending upon the demands of the particular courses being offered. In general, the courses are given during the evening.

Summer Session

The Summer Session begins in early July and consists of six weeks of study for most courses; some courses are longer.

Guided Independent Study *(Distance Education Courses)*

Courses are offered in a limited number of disciplines by distance education (formerly correspondence). Registration for most distance education 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.

Advanced credit and/or advanced placement may be given where appropriate. These provisions apply particularly to Advanced Placement and International Baccalaureate (Higher Level). Advanced placement may be assigned in appropriate subjects with high academic achievement on Advanced Level (G.C.E.)

and Principal Level (H.S.C.). Interested students should apply to the Office of the Registrar (Admissions) for more information.

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.

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

Students with Disabilities

Academically qualified students who have physical, sensory or learning disabilities are encouraged to attend the university. There is a wide variety of services available, including several forms of special assistance, designed to accommodate the needs of persons with impairments and limitations of function.

Students with disabilities should contact the Student Counselling and Resources Centre (228-3811). The services available to students with disabilities are described in the following paragraph.

Disabled Student Services

Services for disabled students are co-ordinated out of the Student Counselling and Resources Centre. These services include the loaning of specialized equipment, the co-ordination of arrangements for students who need special conditions for examinations in their course work, assistance with registration, and the Students Helping Students program. Information on campus accessibility and general information on the assistance the University offers the disabled with their education is provided through the Centre.

In order to receive assistance with registration, disabled students should make an appointment with the Co-ordinator of Services for Disabled Students as soon as they receive their registration package in the mail.

A general information publication for disabled students and a periodic newsletter are available to all disabled students on request. The purpose of the newsletter is to keep disabled students informed about any new services, specialized equipment, accessibility modifications, job opportunities, awards, recreation activities, etc., that materialize during the year.

To arrange an appointment, or for information on all the services available to disabled students, telephone 228-3811, Monday to Friday, 8:30 a.m. to 4:30 p.m.

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+ (2.5) 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 is calculated on the following courses:

1. English 11
2. English 12
3. Social Studies 11 or Science Humaine 11
4. Algebra 11 or Mathematics 11
5. French 11 or another approved language 11 (A beginner's language 11 does not fulfil this requirement.)
6. one Science 11 (Programs in the Faculty of Science may require that the C+ average be calculated on a specific Science 11.)

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

*The courses taken must include all prescribed subjects listed below, under the heading "Specific Program Requirements" for the degree program selected. B.Mus. applicants may substitute a Grade 12 music course.

Algebra 12	Geology 12
Biology 12	Geometry 12
Chemistry 12	German 12
Computer Science 12	History 12
Earth Sciences 12	Japanese 12
English Literature 12	Latin 12
**Français 12 — Langue	Mandarin Chinese 12
**Français 12 — Communication et Littérature	Mathematics 12
	Physics 12
**French 12	Probability & Statistics 12
**French 12A	Spanish 12
Geography 12	Western Civilization 12

**Students may include a maximum of two subjects in French: either French 12 and 12A, or Français 12 — Langue and Français 12 — Communication et Littérature.

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.

International Baccalaureate and Advanced Placement

The University of British Columbia is pleased to recognize enriched secondary school programs of this type. Some courses may be eligible for advanced credit or advanced placement.

Concurrent Enrolment Policy

Students who are enrolled in grade 11 or 12 in a B.C. secondary school may be admitted to the University to pursue "Concurrent Studies" as unclassified students. Normally no more than 6 units of such credit may later be applied towards an appropriate degree at The University of British Columbia.

The following conditions will apply at The University of British Columbia:

The applicant must have a superior academic record.

The applicant must be enrolled in a B.C. secondary school at the grade 11 or 12 level, in a program that meets regular U.B.C. entry requirements.

The applicant must have the written recommendation of the secondary school Principal.

The applicant must have the written consent of the parent or legal guardian if under the legal age of majority on the opening day of classes.

The applicant must have the support of the Dean of the Faculty for the courses in which the applicant plans to enrol.

Admission will generally be limited to one academic session, however, this may be renewable with the continued support of the school Principal and the faculty Dean.

Students in Concurrent Studies will be treated as regular students in most respects except that they may not register in a full range of courses and their eligibility to register is valid for one academic session only (unless renewed as per above). Standard transcripts will be issued and fees and deadlines will be as for regular students.

Students who have enrolled in Concurrent Studies at other recognized post-secondary institutions prior to secondary school graduation may also be eligible for transfer credit.

SPECIFIC PROGRAM REQUIREMENTS

Program Studies in:	Secondary School graduation must include:	In addition if possible:
Agricultural Sciences	Algebra 12 or Mathematics 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 or Mathematics 11 Algebra 12 or Mathematics 12 Physics 11, 12	Geometry 12 Enriched Algebra 12

Architecture
A professional program requiring completion of a first degree for admission. Some alternative qualifications are acceptable.
For specific secondary school program requirements see 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 or Mathematics 11	Algebra 12 or Mathematics 12
For Economics	Algebra 12 or Mathematics 12	
For Speech Sc. Major (Linguistics)	Algebra 12 or Mathematics 12	Physics 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 or Mathematics 12	Physics 12

Commerce and Business Administration

A professional program first requiring completion of undergraduate preparatory year (see Commerce Section).	Algebra 11 or Mathematics 11	Algebra 12 or Mathematics 12

Dentistry

A professional program first requiring completion of a minimum of three years in Science or Arts, or the equivalent thereof.	(As for Arts or Science)	

Education
The minimum requirement for admission to the Elementary Program is completion of three years (45 units) of an approved course of study leading to a degree at UBC with an overall standing of not less than 65%, or the equivalent at an approved university. For admission to the Secondary Program, the minimum requirement is a completed Bachelor's degree in Arts, Science, Physical Education, Commerce or Home Economics with appropriate background in the selected teaching subject(s).

Family and Nutritional Sciences

Dietetics major (B.Sc.(Dietet.))	Algebra 12 or Mathematics 12 Chemistry 11 Physics 11	Biology 11 Chemistry 12 Foods 11 & 12
Family Science major (B.A.)	(As for Arts)	
Home Economics major (B.H.E.)	Algebra 12 or Mathematics 12	Biology 11 Chemistry 12 As many Home Economics courses at the grade 11 and 12 level as possible chosen from: Family Management 11 & 12 Foods 11, 12A & 12B Textiles 11 & 12
Nutritional Sciences major (B.Sc.)	(As for Science)	

Forestry
A professional program with admission following:
a) secondary school
b) first year Science or equivalent, or
c) a two-year Forestry diploma program from a recognized institute of technology (see General UBC admission requirements)

Algebra 12 or Mathematics 12
Two of: Biology 11, Chemistry 11, Physics 11 } All three recommended
Two of: Biology 12, Chemistry 12, Physics 12

Landscape Architecture
Algebra 12 or Mathematics 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 and Information Studies
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).
Alternative route for Science students requires Biology 101 or 102, 200, 201; Chemistry 110 or 120, 205, 230; English 100; Mathematics 100, 101 (120, 121); Microbiology 200; Physics 110, 115 or 120, and an Arts elective (3 units).
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 equivalent).
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 or Mathematics 11
Physics 11

Pharmaceutical Sciences

A professional program first requiring completion of one year in Science (see Science requirements) or Arts.	Algebra 12 or Mathematics 12 Chemistry 11 Physics 11	Biology 11, 12 Chemistry 12 Physics 12

Physical Education

Algebra 11 or Mathematics 11	Algebra 12 or Mathematics 12 Biology 11, 12 Chemistry 11 Physics 11

Rehabilitation Medicine

Professional programs in physical therapy **or** occupational therapy entered following completion of prerequisite studies which normally can be completed in one year at university or college.	Physics 11	Biology 11 Chemistry 11 or 12 Algebra 11 or 12 or Mathematics 11 or 12

Science	Algebra 12 or Mathematics 12 Chemistry 11 Physics 11 One of: Biology 12 Chemistry 12 Computer Science 12 Geology 12 Physics 12	Other courses chosen from: Biology 11, 12 Chemistry 12 Computer Studies 11 Computer Science 12 Earth Science 11, 12 Geology 11, 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 (or the equivalent thereof).	Algebra 11 or Mathematics 11	

B. Adult Basic Education — Provincial Diploma.

The university recognizes the ABE Provincial Diploma for admission to the first year of an undergraduate program. A minimum average of C+ is required based on algebra, English, a science and a language at the Advanced Level and English plus three academic subjects at the Provincial Level chosen from the following: biology, chemistry, physics, geography, history, literature, algebra, geometry, and computer science.

Note: University transfer courses may not be used as part of the ABE Provincial Diploma for admission to UBC.

C. 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 grade point 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 assistance 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 admitted 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.

D. 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 (OAC's) 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% or a completed CEGEP DIPLOMA with an overall average of 70%. 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 with predicted final grades. Offers of early admission are subject to satisfactory completion of secondary school graduation requirements.

E. Applicants Transferring from Post-Secondary Institutions in Canada

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.

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

NOTE 2: An applicant who has studied at a university or college outside Canada must submit an appropriate calendar from that institution at the time of application to The University of British Columbia.

F. International Applicants

The University of British Columbia welcomes applications for admission from outstanding students from other countries. However, because of the limited number of places available for international students in undergraduate programs, competition for admission is keen and superior academic standing is required for admission.

English Proficiency: Admissibility to a specific program or Faculty is dependent on the number of places available and on minimum academic achieve-

ment and English language proficiency as determined by the Faculty or School. A student whose native language is not English must demonstrate proficiency in the English language by obtaining a score of 570 (580 for the Faculty of Arts) on the Test of English as a Foreign Language (TOEFL).

Applicants will be required to take an additional test of English upon arrival at UBC to demonstrate adequate facility with the English language. Those who are found to be inadequately prepared will be required to take English language training. Twelve-week English language courses are offered in the first and second term of the Winter Session and shorter courses are available in the Summer Session. Fees are over and above those for credit courses. Textbooks and other learning materials may be an additional expense. For more information please call the English Language Institute at 222-5208.

Minimum standing for admission in terms of educational credentials:

General Certificate of Education (G.C.E.) — A Certificate with standing in at least five different subjects with two at the Advanced Level. 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.). The subjects must include English, Mathematics or another language and prerequisites appropriate for the intended program of study.

International Baccalaureate (I.B.) — A Diploma with 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.

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

High School Graduation in the United States of America — High school graduation on an academic program. 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.), Higher Level (I.B.), or Advanced Placement may, where appropriate, be considered for advanced placement or advanced credit. (Note: The Faculty of Arts, while assigning advanced placement in some cases, does not assign advanced credit for courses in the IB or AP programs.)

NOTE 3: Applicants should realize that the financial assistance that is available at the undergraduate level is very limited and that opportunities for gainful employment will be severely restricted as a result of immigration regulations.

G. 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".

H. 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 limited.

I. 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 Univerity.

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

J. Visiting Students

Students enrolled in a degree program at another recognized university may apply for admission to take courses for transfer to the home institution. Applicants must be in good standing at the home university and must submit official transcripts and a Letter of Permission with their application. Course registrations will be made on a space-available basis only.

K. English Composition 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 at the first available sitting (i.e. September). The Test will also be given during the December examination period, in late March 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.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

(1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.

(2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

L. English Placement

All students entering The University of British Columbia who have not already completed English 100 or its equivalent are required to enrol in English 100. Students who have a mark of B + or higher in Grade 12 English Literature or a mark of A in Grade 12 English may enrol in enriched 'Z' sections of English 100.

ADMISSION PROCEDURE

Enquiries concerning admission should be made to the:

Office of the Registrar (Admissions),
204-2075 Wesbrook Mall,
The University of British Columbia, Vancouver, B.C., Canada,
V6T 1Z2.
Tel. (604) 228-3014
FAX (604) 228-3599

Application and Document Deadlines 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.

For those Faculties/Schools which have more eligible applicants than they can admit, applications received after the deadline will be returned to the applicants. For those Faculties/Schools which expect to have space available, late applications MAY be accepted. However, late applications will only be considered after all other eligible applications, and it may not be possible to process them before the start of classes. Applications which are not complete by the document deadline may be cancelled if the program sought has been filled by that date.

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

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.

Registration

Registration is the process of formally assigning and recording the enrolment of a student usually in a course or courses. Registration is available only to those students who have received a letter of acceptance for admission or readmission, or to students continuing from one Winter Session to the next, whose transcript of record indicates eligibility to continue.

The registration process at the University is conducted by touch-tone telephone using **Telereg.** There are certain courses that are not available through the **Telereg** system and these are identified in the course schedule section of the **Telereg Guide & Course Schedule** general publication. Other exceptions include registration for Guided Independent Study (distance education [formerly correspondence] courses), and registration as an auditor.

New students and students who have applied for readmission to the University will receive a letter of acceptance followed by a registration package.

Registration Deposit

A registration deposit of $100.00 for the Winter Session, must be paid within two weeks of initial registration. In the case of the final two weeks of registration, all fees, including the deposit, must be paid by September 5, 1990.

If the student attends the session the deposit is applicable to the tuition fees for that session. Failure to pay the deposit will result in the student's registration being cancelled and all courses being dropped. The deposit is not refundable if the student fails to attend the session.

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 five categories of students: (i) regular, (ii) qualifying, (iii) unclassified, (iv) auditor, (v) visitor.

(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 for such status by the Departments concerned and the Faculty of Graduate Studies.

(iii) **Unclassified:** a student enrolled for studies not intended to lead to a particular degree or diploma. Unclassified students should normally have a recognized degree. Students without a degree who are eligible for admission to the university may be admitted as unclassified students (a) to allow them to take a limited number of courses in a specific area to upgrade or achieve a qualification, or (b) when they are not admissible to or do not wish to enter a specific program. Students in category (b) may take no more than 6 units per academic year and no more than 9 units in total while registered as unclassified. Admission as an unclassified student does not guarantee that a student will be able to register for any course offered. Unclassified students may only register in a course with the permission of the Faculty giving the course. Admission as an unclassified student does not imply future admission as a regular student.

Unclassified students will not receive transfer credit since they are not in a program to which credit can be transferred. Students with a failed year in a Faculty will not be admitted as unclassified until they have discontinued their studies for at least one year. After a second failed year admission as unclassified will be subject to the approval of the Senate Admissions Committee.

(iv) **Visitor:** A student enrolled in studies for transfer to a degree program at another recognized university. (A Letter of Permission is required.)

(v) **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 nonacademic 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.

POLICIES AND PROCEDURES FOR SENATE APPEALS ON ACADEMIC STANDING

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. Following are the policies and procedures of this Committee:

I. *Composition of the Committee*

1.01 The Committee consists of eleven members, six of whom are members of Senate who are faculty members, three of whom are members of Senate who are students, and two of whom are members of Senate who are neither faculty members nor students. The Chancellor, the President and the Registrar are members of the Committee ex officio; the Chancellor and the President, but not the Registrar, shall be entitled to vote.

II. *Terms of Reference*

2.01 (1) The Committee shall hear and dispose of appeals by students from decisions of Faculties on matters of Academic standing, but the Committee has no jurisdiction where the sole question raised in an appeal turns on the exercise of academic judgement by a Faculty.

(2) Not only in this part, but in these regulations generally, a "Faculty" shall be deemed to include, where necessary, any other appropriate administrative unit of the University, and "Dean of the Faculty" shall be deemed to refer, where necessary, to any other appropriate officer of the University.

2.02 (1) Subject to (2) of this paragraph, the decision of the Committee on an appeal is a final disposition of that appeal. Senate has conferred on the Committee the power of making final decisions pursuant to Section 36(b) of the University Act.

(2) If an issue on an appeal raises, in the opinion of the Committee, an unsettled question of policy or procedure of general importance to the University, the Committee may refer that question to the Senate for a ruling.

2.03 (1) The Committee shall allow an appeal where it decides that the decision has been arrived at through improper or unfair procedures, and that as a result a wrong decision on the merits has or may have been arrived at. Without limiting the generality of the phrase "improper or unfair procedures" it shall be construed to include the consideration of information which ought not to have been considered, and the failure to consider information that ought properly to have been considered.

(2)"Allow an Appeal" means such one of the following as the Committee deems appropriate in any given case:

(a) A reversal of the decision of the Faculty, and the granting of such academic standing to the appellant as the Committee thinks fit in the circumstances; or

(b) A quashing of the decision of the Faculty, and the sending of the matter back to the Faculty to be dealt with in accordance with proper procedures.

2.04 (1) In all cases other than those falling within paragraph 2.03 the Committee shall dismiss the appeal.

(2) "Dismiss the Appeal" means to decide that the decision being appealed from is confirmed.

2.05 In order to ensure that an appeal is fairly conducted, the Committee may in any particular case waive any of the procedural rules provided for in these regulations, or may make such further ancillary rulings on procedure as it sees fit.

2.06 Members of the Committee will not discuss the substance of an appeal with any of the parties other than at a hearing.

2.07 The Committee shall make annual reports to Senate. The report shall state the number of appeals heard, their disposition, and the general nature of the appeals, and shall draw Senate's attention to any other matters of general significance in the University which have arisen out of the Committee's work.

III. *Procedures Prior to the Hearing*

3.01 A student who wishes to appeal a decision of a Faculty shall lodge a written notice of appeal with the Registrar within 10 days of being informed in writing of the Faculty's final decision.

3.02 Within 5 days of receiving a notice of appeal, the Registrar shall send to the appellant a copy of these regulations, and in addition shall inform the appellant that he or she is entitled to appear before the Committee in person and may also be represented by counsel.

3.03 Within 15 days of receiving the regulations, the appellant shall file with the Registrar a statement of appeal. This should contain:

(a) A statement of the decision from which the appeal is being taken;
(b) A statement of the relief which the appellant seeks;
(c) A brief chronological statement of the circumstances relating to the appeal;
(d) Copies of any documents which the appellant intends to rely on at the hearing;
(e) The names of any witnesses the appellant proposes to call at the hearing. It is the appellant's responsibility to ensure that such witnesses are present at the hearing.

3.04 Within 5 days of its receipt the Registrar shall send the appellant's statement of appeal to the Dean of the Faculty from which the appeal is being taken.

3.05 Within 15 days of the receipt from the Registrar of the appellant's statement of appeal, the Dean shall file a response with the Registrar. This should contain:

(a) A confirmation of the nature of the decision from which the student is appealing or, if the decision is not properly stated in the appellant's statement of appeal, a statement as to the nature of the decision;
(b) A statement whether, assuming the appeal were to be allowed, the relief sought by the student ought properly to be granted;
(c) The Faculty's response to the grounds of appeal;
(d) The Faculty's comments on the chronological statements of events;
(e) Copies of any documents which the Faculty intends to rely on at the hearings;
(f) The names of any witnesses the Faculty proposes to call at the hearing.

3.06 Within 10 days of the receipt of the Faculty's response, the Registrar shall set a date for a hearing. The hearing should usually take place within two months of the receipt of the Faculty's response.

3.07 Prior to the hearing the Registrar shall circulate copies of material submitted by the appellant and the Faculty to the members of the Committee, the appellant and the Faculty.

3.08 The time limits referred to in paragraphs 3.01-3.06 are intended as outside limits, and all parties are encouraged to make every effort to proceed more quickly if possible.

3.09 Not only in this part, but in these regulations generally, a reference to a number of days shall not be construed as including Saturdays and Sundays and any other days on which the University is closed.

3.10 The Registrar may, of his own volition or at the request of the appellant or the Faculty, extend the time limits provided for in these regulations. If the Registrar refuses to extend the time limits on the request of the appellant or the Faculty, his decision may be appealed to the Committee as a whole, and the Committee may, acting pursuant to its authority under Paragraph 2.05, extend the time limits as it sees fit.

3.11 The Senate Committee may, at its discretion, dismiss an appeal for lack of prosecution.

IV. *Procedures at the Hearing*

4.01 A quorum for any hearing before the Committee shall consist of at least five voting members, or any lesser number if that is agreed to by the appellant and the Faculty.

4.02 A member of the Committee shall not take part in an appeal where to do so would involve the member of the Committee in a conflict of duty and interest.

4.03 At the hearing, subject to the rulings of the Committee, the following procedure should be followed:

(a) The appellant may make an opening statement;
(b) The appellant may call and examine such witnesses as he or she sees fit;
(c) The Faculty may cross-examine any of the witnesses called by the appellant, including, where appropriate, the appellant;
(d) The Faculty may make such opening statement as it sees fit;
(e) The Faculty may call and examine such witnesses as it sees fit;
(f) The student may cross-examine any of the Faculty's witnesses;
(g) The appellant may make a closing statement;
(h) The Faculty may make a closing statement;
(i) The appellant may respond to any matters arising out of the Faculty's statement to which he or she has not yet spoken.

4.04 The Committee may request that it be provided with further information other than that supplied initially by the appellant or the Faculty. Without limiting this general power if, after a hearing, the Committee is of the opinion that it requires further information in order to reach a decision it may either ask that that information be supplied at a further hearing or, without a hearing, it may ask that the information be supplied to it in writing. In the latter case both the appellant and the Faculty must be given the opportunity of commenting on the information so supplied before the Committee reaches a final decision.

V. *The Decision*

5.01 The Committee may arrive at a decision on the basis of a majority vote of those voting members of the Committee present at the hearing.

5.02 In the event of a tie vote an appeal shall be dismissed.

5.03 The decision of the Committee shall be communicated in writing to the appellant and to the Dean of the Faculty within 10 days of the final hearing of the appeal.

5.04 The Committee shall give reasons for its decision; and in the case of a minority vote, the minority may if it wishes give reasons for its dissent.

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 statement of illness, 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.

STUDENTS ENTERING A GRADUATING YEAR

No student in a graduating year may be excluded from a course necessary to meet degree program requirements because of lack of space. A student who is confronted with such a situation should consult the Dean, Director, Department Head, or Faculty adviser. *This rule does not apply to elective courses or to preferred sections of courses.*

MEDICAL, EMOTIONAL OR OTHER PROBLEMS

The policy of the University is to encourage students to complete their course work and degree programs. Students who are suffering from medical, emotional or other problems which may adversely affect their attendance or their performance in a course or program *must* notify the Office of the Dean of the Faculty of their degree program, as well as their instructors, as soon as possible.

While the University will make an effort to ensure that students are not unduly penalized, it is the responsibility of the student to notify the Dean's Office as

close as possible to the time his or her attendance or performance is adversely affected. The University, in making a decision on a student's standing or on any reconsideration or appeal of that decision, will not normally take into account untimely notifications. When the student notifies the Dean's Office, he or she will be asked to provide such evidence as is deemed appropriate.

The action that may be taken by the University will depend on the circumstances of each case. If a student is permitted or required to withdraw, the University will ensure that a student who is in good academic standing at withdrawal is permitted to re-enrol in the program of studies from which he or she withdrew. The student who is permitted or required to withdraw may be told the time period during which an application for re-enrolment will be permitted. A suitable medical certificate may be required to help satisfy the University that the student who is permitted to re-enrol is ready to successfully continue his or her studies.

In addition to acting in accordance with this general policy, students should also observe the specific provisions on "Examinations" below, and on "Routine Regarding Absence due to Sickness or Injury". See index under STUDENT HEALTH SERVICE.

CHANGE OF REGISTRATION

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. 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 standing of "F" with a grade which reflects performance in the course. 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. Students who miss an examination either in December or April because of medical, emotional or other problems must notify the Dean of their Faculty or Director of their School as soon as possible. If there is a medical problem they must submit a statement of illness obtained from a doctor to the Student Health Service. This statement must be in the hands of the Student Health Service within the current examination period. If appropriate, a medical certificate will be issued by the Student Health Service with copies to the Registrar and the Dean of the Faculty or Director of the School in which the student is registered.

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, computers, 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%.

Faculties, Departments and Schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, Faculty, Department or School norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the Faculty, Department or School. Grades are not official until they appear on a student's transcript.

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. However, 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. In a course that is repeated, both marks will appear on the transcript. The higher mark will be used to determine promotion in a program and in any decision to admit a student or withdraw a student from a program. Averages calculated for other purposes will include both marks.

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.

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

If a student withdraws from a one-term course within the first two weeks, or within the first three weeks of a course offered over two terms, no record of the registration will appear on the transcript.

Students may withdraw from courses in which they are registered at any time up to the end of the sixth week of class for courses which are offered in a single term, and of the twelfth week for courses which span two terms. Withdrawals will be noted on the transcript by a standing of "W". Such standings will not be included in computing averages. The effective dates for 1990-91 are:

Tuesday, September 18, 1990	Last date for withdrawal from a Term 1 course with no "W" notation appearing on the transcript.
Friday, September 21, 1990	Last date for withdrawal from a two-term course with no "W" notation appearing on the transcript.
Friday, October 12, 1990	Last date for withdrawal from a Term 1 course with a standing of "W" noted on the transcript. After this date withdrawal is not permitted and students will be graded on the basis of whatever they have done in the course. Students who do not attend but remain registered and neglect to withdraw during the withdrawal period will normally find an "F" standing on their transcript.
Friday, November 23, 1990	Last date for withdrawal from a two-term course with a standing of "W" noted on the transcript.
Monday, January 21, 1991	Last date for withdrawal from a Term 2 course with no "W" notation appearing on the transcript.
Friday, February 15, 1991	Last date for withdrawal from a Term 2 course with a standing of "W" noted on the transcript.

Fee refunds for withdrawals will be calculated on a pro-rata basis. (See FEES, Item 11, Prorating of Fees.)

Auditors may withdraw without prejudice at any time; in the case of withdrawal, the record of registration will be removed from the transcript.

Students may withdraw from courses outside the limits described above only with the permission of the Dean of the Faculty in which they are registered. In such cases, the instructor should be informed. Such withdrawals will be recorded as "W" on the student's transcript.

Faculties may, at their discretion, limit the number of "W" standings permitted to a student. Any withdrawals in excess of that limit that would normally produce a standing of "W" will result in assignment of "F" for the course or courses involved. Normally, a student may not withdraw from a course more than once.

After **Telereg** closes, a student who decides to withdraw from the University must present a Change of Registration form, 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.

WITHDRAWAL FOR UNSATISFACTORY CONDUCT

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 courses is issued in February by the Office of Extra Sessional Studies, and is available upon request from the Registrar.

Regulations are as follows:

1. The maximum credit for Summer Session or 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 degree credit courses offered extra-sessionally during Winter Session, Spring and Summer Sessions, and with the Directed Study Abroad Program is handled through the Office of Extra-Sessional Studies. Guided Independent Study Distance Education courses (formerly Correspondence Courses) are administered through the Office of Guided 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 all faculties. In general, a student is not likely to be able to complete more than one-third to one-half 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.

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. Except in special cases no student may repeat a course more than once.

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. The specific provisions as to Offences, Penalties and Procedures which are set out below should not be construed as limiting the general authority of the President under the University Act.

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 constitutes 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. Cheating includes, inter alia, having in an examination any materials other than those authorized by the examiners.
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 readmission 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 penalties which may be imposed, singly or in combination, for any of the above offences may include, but are not limited to, the following:

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.
5. A notation on the student's permanent record of the penalty imposed.

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. In general, the first instalment consists of 50% of the tuition assessment plus 100% of student fees and the second 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. **It is the responsibility of students to calculate their fees based on the information in this Calendar, and to make their payments by the due dates. Students will not receive invoices.**

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, 23 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 $112.00 per unit is charged for the following programs:

Arts
- Bachelor of Arts
- Bachelor of Fine Arts
- Bachelor of Home Economics
- Bachelor of Science in Dietetics
- Diploma Programs

Commerce and Business Administration
- Bachelor of Commerce

Education
- Bachelor of Education
- Diploma and Teacher Training Programs
- Bachelor of Physical Education
- (For a (0) unit Education Practicum or Field Experience not taken concurrently with a credit course, a two-unit charge will be assessed.)

Science
- Bachelor of Science

Undergraduate Auditors

Illustration of tuition fees charged:

(i) **15 unit program at $112.00 per unit:**

Tuition (15 × $112.00)	=	$1,680.00
Student Fees (**see Items 6 and 7**)	=	82.75
Plus applicable student society fee (**see Item 8**)	=	
		$

(ii) **18 unit program at $112.00 per unit:**

Tuition (18 × $112.00)	=	$2,016.00
Student Fees (**see Items 6 and 7**)	=	82.75
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 a percentage of the program fee based on the number of units of a full program. Such students should contact the Registrar's Office to have their fees calculated.

Agricultural Sciences	
Bachelor of Science (Agriculture)	
First Year	$1,854.00
Other Years	$2,226.00[1]
Bachelor of Landscape Architecture	
First Year	$2,030.00
Other Years	$2,175.00
Applied Science	
Bachelor of Architecture	$2,175.00
Bachelor of Applied Science (Engineering)	$2,175.00
Bachelor of Science in Nursing	
First Year	$1,884.00
Other Years	$2,015.00
Arts	
Master of Archival Studies	$1,751.00
Master of Library Science	$1,751.00
Bachelor of Music	$1,869.00
Bachelor of Social Work	
Third and Fourth Years	$1,884.00
Fifth Year (Concentrated)	$2,609.00
Dentistry	
Doctor of Dental Medicine	$2,900.00
Diploma Program (Periodontics)	$3,295.00
Residents	$ 211.00
Forestry	
Bachelor of Science in Forestry	
First Year	$1,884.00[2]
Other Years	$2,231.00
Bachelor of Science (Forestry)	
First Year	$1,884.00[2]
Other Years	$2,231.00
Law	
Bachelor of Laws	$2,247.00
Medicine	
Doctor of Medicine	$2,900.00
Residents and Interns	$ 211.00
Bachelor of Medical Laboratory Science	$2,247.00
Rehabilitation Medicine —	
Bachelor of Science in Occupational Therapy	$2,030.00
Bachelor of Science in Physical Therapy	$2,030.00
Pharmaceutical Sciences	
Bachelor of Science in Pharmacy	$2,247.00

Notes

[1] Third Year Agricultural Science students will be assessed a field trip fee of $210.00.

[2] Forestry students taking Forestry 351 and 451 will be assessed a field trip fee of $300.00 and $410.00 respectively.

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

A fee of $112.00 per unit is charged for courses numbered under 500. For courses numbered 500 and above, the fee is $286.00 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 $43.25 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 $4.72 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	$12.50
Capital projects (CPAC)	15.00
Intramural sports	4.50
Athletic fee (Intercollegiate)	7.00
Refugee students assistance	.50
	$39.50

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

8. **Undergraduate Society Fees**

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.))	$20.00	Law	$12.00
Agriculture (B.L.A.)	$20.00	Library, Archival and Information Studies	$15.00
Architecture	$20.00	Medicine	
Arts (B.A., B.F.A., B.Mus. and Diploma Programs)	$ 7.00	First & Second Years	$28.00
Commerce (B.Com.)	$ 5.00	Third & Fourth Years	$38.00
Dentistry	$40.00	Nursing	$18.00
Education (including Diploma Programs)	$ 2.00	Pharmacy	$18.00
Engineering	$18.00	Physical Education	$10.00
Forestry	$30.00	Rehabilitation Medicine	$ 6.00
Family and Nutritional Sciences (B.H.E.) and B.Sc. (Dietet.)	$ 7.00	Social Work	$ 5.00
		Science	$10.00

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.) 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.

Tuition Fees

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 eliminate a student's obligation to pay all assessed fees.

The refund of fees to students who withdraw from a course or courses after registration will be calculated as shown below. When a Program Fee is charged

the fee for each course will be calculated as described in item 3(b). The Registration Deposit of $100.00 is not refundable. Effective the first day of classes all students are assessed a minimum non-refundable fee of $100.

(i) Refund for two-term courses:

First Term

During first three weeks of lectures	100% of the fee for units dropped.
During fourth week of lectures	70% of the fee for units dropped.
During fifth week of lectures	60% of the fee for units dropped.
During sixth week of lectures	50% of the fee for units dropped.

After the fifth week of classes there is no refund of any part of the first instalment of tuition fees.

Second Term

During first two weeks of lectures	40% of the fee for units dropped.
During third week of lectures	30% of the fee for units dropped.
During fourth week of lectures	20% of the fee for units dropped.
During fifth week of lectures	10% of the fee for units dropped.

After the fifth week of lectures there will be no refund of tuition fees for two-term courses.

(ii) Refund for one-term courses:

During first two weeks of lectures	100% of the fee for units dropped.
During third or fourth week of lectures	60% of the fee for units dropped.
During fifth or sixth week of lectures	40% of the fee for units dropped.
During seventh or eighth week of lectures	20% of the fee for units dropped.

After the eighth week of classes there is no refund of any part of the tuition fee for one-term courses.

Student Fees

These include the Student Activity fee, the AMS fees, and any other special fees for undergraduate or graduate student societies, facilities or activities.

There is no refund of the undergraduate or graduate student society fees.

If a student's sessional unit load drops below 9 units:

(a) before or during the fifth week of lectures in the first term; or

(b) before **Telereg** closes for second term course changes when second term courses are dropped;

the Student Activity fee and the AMS fees are adjusted based on unit load.

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. **Late Registration**

A late registration fee of $50 additional to all other fees is assessed if registration is not initiated by the appropriate date for the term in which the student is registering.

13. **Reinstatement**

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 $50.00 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** **$3,358.00**

(i) A candidate enrolled in a Master's program **before September 1, 1989** is required to maintain continuous registration by paying tuition instalments as indicated below in each successive year following admission to the degree program.

Except as noted below, the minimum fee for the MASTER'S degree is $3,358.00.

Candidates may elect to pay fee instalments as listed below or on a unit basis of $286.00 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 a continuing fee of $898.00 per annum plus applicable authorized student fees.

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

First Year	$1,856.00
Second Year	1,502.00
Each subsequent year, continuing fee	898.00
On Leave fee per annum	198.00
Extension fee per annum	1,260.00

(ii) A candidate enrolling in a Master's program **on or after September 1, 1989** is required to maintain continuous registration by paying tuition instalments according to Schedule A or B as listed below (these fees do not include authorized student fees).

Candidates planning to complete their degree through full-time study **must** select the two-year schedule of payments (Schedule A). Only candidates planning to take their degree through part-time study are permitted to select the four-year schedule of payments (Schedule B). Candidates are obliged to follow the schedule of payments selected at the time of initial registration. **It is not permitted to switch from one schedule of payments to another after the initial payment. Students who select Schedule B are advised that, by virtue of their part-time status they are ineligible to receive government loans, interest-free status and University Fellowships.**

Schedule A (available to all students)*

Except as noted below, the minimum fee for the Master's degree is $3,358.00, to be paid in six continuous instalments following admission to the degree program according to the following schedule of payments (these fees do not include authorized student fees):

First Year total fees		$1,679.00
Instalment No. 1	$559.67	
Instalment No. 2	$559.67	
Instalment No. 3	$559.66	
Second Year total fees		$1,679.00
Instalment No. 4	$559.67	
Instalment No. 5	$559.67	
Instalment No. 6	$559.66	

The minimum payment for a candidate for the Master's degree who selects Schedule A and who completes the degree requirements within twenty-four consecutive months of first registration in the Faculty of Graduate Studies will be the total fees assessed for each four-month period during which the student is registered in the Faculty except that no candidate will pay a total tuition fee of less than $1,679.00. Applicable authorized student fees will also be assessed. Candidates who interrupt their studies in the first or second year of candidacy are not eligible for this reduced assessment.

Schedule B (available only to part-time students)*

The minimum fee for the Master's degree is $3,856.00, to be paid in twelve continuous instalments following admission to the degree program according to the following schedule of payments (these fees do not include authorized student fees):

First Year total fees		$ 964.00
Instalment No. 1	$321.34	
Instalment No. 2	$321.33	
Instalment No. 3	$321.33	
Second Year total fees		$ 964.00
Instalment No. 4	$321.34	
Instalment No. 5	$321.33	
Instalment No. 6	$321.33	
Third Year total fees		$ 964.00
Instalment No. 7	$321.34	
Instalment No. 8	$321.33	
Instalment No. 9	$321.33	
Fourth Year total fees		$ 964.00
Instalment No. 10	$321.34	
Instalment No. 11	$321.33	
Instalment No. 12	$321.33	

A candidate for the Master's degree who selects Schedule B and who completes the degree requirements within forty-eight consecutive months of first registration in the Faculty of Graduate Studies will be assessed a total fee of not less than $3,856.00, plus applicable authorized student fees.

Fees applicable to both Schedules A and B

Each subsequent year, continuing fee	$ 898.00
On Leave fee per annum	$ 198.00
Extension fee per annum	$1,260.00

* The first payment if starting in September is due September 5, 1990; if starting in January, the due date is January 7, 1991; if starting in May, the due date is May 1, 1991; if starting in July, the due date is June 26, 1991. Subsequent payments will be due in September, January and May.

Candidates for all Master's degree programs, **including part-time candidates,** *must* maintain continuous registration through all years until graduation by keeping up with fee payments. Failure to pay fees will result in automatic withdrawal from the Master's degree program. For reinstatement in the program students will be required to pay the reinstatement fee of $150.00 in addition to the unpaid fees retroactive to the date of last payment.

Master's Degree and Diploma in Dentistry
Tuition Fees **$8,369.00**

A candidate is required to maintain continuous registration by paying tuition instalments as indicated below in each successive year following admission to the program.

First Year	$3,295.00
Second Year	3,295.00
Third Year	1,779.00†
Each subsequent year, continuing fee	788.00
On Leave fee per annum	198.00

† Should additional clinical studies be required in the third year of the program a further fee of $1,141.00 will be assessed in the third year.

Combined Master of Business Administration and Bachelor of Laws **$8,804.00**

A candidate is required to maintain continuous registration by paying tuition instalments as indicated below in each successive year following admission to the combined program.

First Year	$2,247.00
Second Year	2,155.00
Third Year	2,247.00
Fourth Year	2,155.00
Each subsequent year, continuing fee	788.00
On Leave fee per annum	198.00

Student fees:

The total student fees for a full time Winter Session student are $199.75. These include:

Alma Mater Society	$ 39.50
Student Activity Fee	$ 43.25
Capital Improvement Fund	$ 5.00
Dental Plan Fee	$ 86.00
Graduate Student Centre	$ 25.00
Graduate Student Association	$ 1.00
	$199.75

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, Capital Improvement Fund fee $5.00, Student Activity Fee $4.72 per unit. Summer Session student fees are assessed as follows. Alma Mater Society $2.00 per unit; Graduate Student Centre $8.00; Summer Session Association $5.00.

17. **Doctoral Degree Tuition Fees** **$4,916.00**

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

A candidate enrolled for a Doctoral degree **before September 1, 1989** is required to maintain continuous registration by paying fee instalments as indicated below in each successive year following admission to the degree program.

Doctoral degree tuition instalments:

First Year	$1,856.00
Second Year	$1,562.00
Third Year	$1,498.00
Each subsequent year, continuing fee	$ 898.00
On Leave fee per annum	$ 198.00
Extension fee per annum	$1,260.00

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.

A candidate enrolling in a Doctoral program **on or after September 1, 1989** is required to maintain continuous registration in the Faculty of Graduate Studies following admission to the degree program by paying tuition fees in continuous instalments according to the following schedule of payments. Applicable authorized student fees will also be assessed.

First Year total fees		$1,679.00
Instalment No. 1	$559.67	
Instalment No. 2	$559.67	
Instalment No. 3	$559.66	
Second Year total fees		$1,679.00
Instalment No. 4	$559.67	
Instalment No. 5	$559.67	
Instalment No. 6	$559.66	
Third Year total fees		$1,559.00
Instalment No. 7	$519.67	
Instalment No. 8	$519.67	
Instalment No. 9	$519.66	

Each subsequent registration, continuing fee per annum	$ 898.00
On Leave fee per annum	$ 198.00
Extension Fee per annum	$1,260.00

A student at this University who transfers to the Doctoral program after exactly one year in a Master's program will pay fees on the same schedule as Doctoral candidates.

The first payment if starting in September is due September 5, 1990; if starting in January, the due date is January 7, 1991; if starting in May, the due date is May 1, 1991; if starting in July, the due date is June 26, 1991. Subsequent payments will be due in September, January and April.

All candidates *must* maintain continuous registration throughout all years until graduation by keeping up with fee payments. Failure to pay fees will result in automatic withdrawal from the Doctoral degree program.

For reinstatement in the program students will be required to pay the reinstatement fee of $150.00 in addition to the unpaid fees retroactive to the date of last payment.

Student fees:

Alma Mater Society	$ 39.50
Student Activity Fee	$ 43.25
Capital Improvement Fund	$ 5.00
Dental Plan Fee	$ 86.00
Graduate Student Centre	$ 25.00
Graduate Student Association	$ 1.00
	$199.75

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

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 Graduate 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 a 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 $203.00 plus approved student fees.

22. **Spring and Summer Session**

Tuition fees payable (except Graduate Studies): $112.00 per unit

Summer Session Association	5.00
Graduate Student Centre, Summer Session	8.00

Auditor — regular tuition fee.

Spring and Summer Session students are assessed a Student Activity fee of $4.72 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 undergraduate student fees payable for the period September 1 to August 31 are $39.50 (AMS) and $43.25 Student Activity Fee.

23. **Guided Independent Study Courses**

Fees will be charged on a per unit basis of $121.00. The fee for a three-unit course is $363.00, plus a non-refundable materials charge of $18.00 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 $303.00 for 3 units; $151.50 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 a location not normally set up for UBC examinations, a Special Invigilation and Outside

Examination Centre Fee of $55.00 is charged. Supplemental examination fees are the same as those given under "Special Fees" below.

Forestry 111 (Section 999) — additional Laboratory fee $100.00
Forestry 204, 302, 308 (Sections 999) — additional Laboratory fee $65.00
Forestry 237 (Section 999) — additional Laboratory fee $65.00
Forestry 405 (Section 999) — additional Laboratory fee $80.00
Nursing 302 (Section 999) — additional Clinical Tutorial fee $100.00
Nursing 303 (Section 999) — additional Clinical Tutorial fee $100.00
Nursing 441 (Section 999) — additional Clinical Tutorial fee $100.00
Soil Science 200 (Section 999) — additional Laboratory fee $65.00

24. **Special Fees**

Application Processing Fees:	
For applicants presenting British Columbia documents	$15.00
For applicants presenting documents from outside B.C.	$25.00
(made up of $15.00 Processing Fee and $10.00 Evaluation Fee)	
For late registration, all sessions	$50.00
Dishonoured cheque	10.00
For reinstatment after cancellation of registration	50.00
Guided Independent Study	
Credit Course Examinations at UBC and at designated centres (per paper)	10.00
Special Invigilation and Outside Exam Centre Fee (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	153.00
Dentistry, short-term visiting students	50.00
Library (replacement cards)	6.00
Field Trip Fees:	
Agricultural Economics 400	25.00
Agricultural Sciences 300	210.00
Anthropology 306	variable
Architecture 406	400.00
Architecture 512 (extra sessional)	550.00
Biology 205 (optional field trip)	variable
Biology 326 (optional field trip)	variable
Biology 328 (optional field trip)	variable
Biology 409	variable
Biology 426	variable
Biology 427	variable
Biology 428 (optional field trip)	variable
Geography 309	up to 300.00
Forestry 351 (Interior Field Trip)	300.00
Forest Harvesting 352	variable
Forestry 451 (Coast Field Trip)	410.00
Wood Science & Industry 353	variable
Geology 335	500.00
Landscape Arch. 199	
Accommodation, instruction, administration	150.00
Transportation, meals	150.00 - 350.00
Calendar Fee	3.00
Calendar sent by mail (including $3.00 fee)	
Canada	6.00
U.S.A.	7.50
Outside Canada (excluding U.S.A.)	10.00

Transcript Fees:

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

AWARDS AND FINANCIAL AID

The University offers a wide range of programs to recognize students with high academic achievement and provide financial assistance 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. 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 101), 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.

UNDERGRADUATE STUDENTS

There are many forms of assistance available to undergraduate students (including those in professional programs) attending winter session at the University of British Columbia. They fall into two general categories, awards based on academic achievement (scholarships and prizes, etc.) and financial assistance based on need (bursaries, loans and work study).

SCHOLARSHIPS

Students demonstrating outstanding academic performance will be considered for scholarships and other academic awards. These awards have been made available through contributions from industry, unions, organizations, individuals, and University operating funds. Although many scholarships are awarded on the recommendation of a specific faculty or department, without the need for an application, some scholarships do require that the student apply.

Several major entrance scholarships ranging in value from $2,500 to $6,200 per year, are offered to students entering the University from secondary school. These awards include:

National Scholarships — The University of British Columbia offers up to 10 awards of $26,000 (payable at $6,500 a year) each to outstanding students entering undergraduate programs from secondary schools in Canada. The awards will be based primarily on the student's scholarly achievement. Renewals are subject to continued scholarship standing.

The Mount Pleasant Branch #17, Royal Canadian Legion Scholarship — A $20,000 scholarship (payable at $5,000 a year) has been made available by the Mount Pleasant Branch of The Royal Canadian Legion, Vancouver, B.C., through the Vancouver Foundation. It will be awarded to a student entering the University from a Canadian secondary school. The applicant must be a Canadian citizen (a) born in Canada or (b) born of Canadian parent(s). In selecting candidates, consideration will be given to scholastic achievement and personal qualities, as well as interest and participation in school or community activities. In order to receive the renewals, the winners must maintain scholarship standing.

The Bert Henry Memorial Scholarship — An $18,000 scholarship (payable at $4,500 a year) has been made available by the late Gladys Henry. The award will be made to a student proceeding from a senior secondary school to The University of British Columbia. The award will be based primarily on the student's scholarly achievement. In order to receive the renewals, the winners must maintain scholarship standing.

Chancellor's Entrance Scholarship — The University of British Columbia offers a minimum of 20 scholarships in the amount of $12,000 each (payable at $3,000 a year) to outstanding students entering undergraduate programs from senior secondary schools. The awards will be based primarily on the students' scholarly achievement. In order to receive the renewals, the winners must maintain scholarship standing.

President's Entrance Scholarships — The University of British Columbia offers up to 25 scholarships in the amount of $2,500 each to outstanding students entering undergraduate programs from senior secondary schools. Holders of this scholarship who maintain scholarship standing may receive a minimum scholarship of $1,200 per annum for a further three years of study.

University of B.C. Royal Institution Entrance Scholarships — Two scholarships in the amount of $2,500 each will be awarded to outstanding students entering undergraduate programs from senior secondary schools. The awards will be based primarily on the students' scholarly achievement. Holders of this scholarship who maintain scholarship standing may receive a minimum scholarship of $1,200 per annum for a further three years of study.

In addition to the major entrance scholarships listed above, the following faculties or schools offer large scholarships to outstanding students entering their discipline: Engineering, Forestry, Agriculture, Music. There is also a range of smaller general scholarships, ranging in value from $500 to $1,800 each, to recognize academic excellence in entering students.

Students entering UBC directly from Grade 12 must apply for major entrance awards and general scholarships by April 15. Other new students and those who are returning to UBC after one or more years' absence must submit an application for general scholarships by May 15 if they wish to be considered for academic awards. Some scholarships require special affiliations with clubs, unions, businesses, the armed services, etc. Applications for affiliation awards are available in early spring and must be submitted by May 15.

Note: Since deadlines may change from year to year, students planning to enter UBC in 1991 should contact the Awards Office early next year.

FINANCIAL AID

The major source of assistance for B.C. students anticipating financial difficulties in pursuing their educational objectives, is the British Columbia Student Assistance Program (BCSAP). B.C. students may obtain up to $6,800 ($10,200 for students with dependent children) in a combination of Canada Student Loan and British Columbia Student Loan or Equalization Payments. Students from other provinces may be able to obtain assistance through their "home" province. The University also offers bursaries, work study, and emergency loans to students demonstrating financial need. Students wishing to apply for BCSAP or similar assistance are encouraged to apply early. Applications are available in the spring and should be submitted prior to June 30, for students needing their funds by the beginning of the term. Applications for general bursaries are available in September and the submission deadline is October 1. A limited number of bursaries require a special application which must be submitted by May 15. Students requiring assistance should obtain the publication entitled **Awards and Financial Aid, The University of British Columbia** which contains detailed information.

GRADUATE STUDENTS

Financial support for graduate students usually comes from one of four basic sources: (a) merit-based awards administered by the Faculty of Graduate Studies; (b) teaching and research assistantships administered by individual departments; (c) need-based awards administered by the Office of Awards and Financial Aid; (d) external awards from other agencies.

The major source of assistance for B.C. students anticipating financial difficulties in the pursuit of their educational objectives is the British Columbia Student Assistance Program (BCSAP). B.C. students may obtain up to $5,460 in Canada Student Loans and $4,940 ($10,140 for students with dependent children) in B.C. Student Loans for a twelve-month program. Students from other provinces may be able to obtain assistance from their "home" province. The University also offers bursaries, work study, and emergency loans to students demonstrating financial need. Students wishing to apply for BCSAP or similar assistance are encouraged to apply early. Applications are available in the spring and should be submitted prior to June 30, for students needing their funds by the beginning of the term. Applications for general bursaries are available in September and the deadline is October 1. Students requiring assistance should obtain the publication entitled: **Awards and Financial Aid, The University of British Columbia** which contains detailed information.

REGULATIONS GOVERNING UNIVERSITY AWARDS

The following regulations govern all awards over which the University has jurisdiction:

1. Unless otherwise stated, awards are tenable only at U.B.C. and are open to winter session students only. Marks obtained in extra-sessional courses are not taken into account.
2. An award designated as a scholarship will normally be made only to students standing in the top 10% of their year and faculty, or with an average of 75% or higher. Prizes or other academic awards which are based on performance in a specific course require that students stand in the top 10% of those registered in the course, or obtain an average of 75% or higher for the course in question and be in good standing in their Faculty. Where scholarships are renewable or include a guarantee of continuing support subject to the student maintaining scholarship standing, this shall be interpreted as meaning that a student must successfully complete at least 90% of a full program of study with an overall average of at least 80%, or stand in the top 10% of a particular year and degree program.
3. To be eligible for a scholarship, students must have completed a full program of study for the year and faculty in which they were enrolled. This is defined as 90% or more of a full course load as listed in the fee table maintained by the Registrar's Office. The standing of students taking more than the required number of units will be determined on the basis of the required number of units to be chosen in a manner most advantageous to the student.
4. Candidates are permitted to hold more than one academic award only with the permission of the Awards Office. A winner, who so desires, may retain the honour of winning an award but resign the monetary value. Any funds thus made available will be used for additional awards.
5. Awards issued by the University will be applied to tuition fees. If the amount of the award is greater than the fees, the excess will be paid to the student after the tuition fees have been deducted. Cheques should be picked up at the Financial Services Department, Room 101, General Services Administration Building, on the dates indicated on individual award notices.
6. Holders of scholarships and bursaries will be expected to be enrolled in a minimum of 12 units of study or, in the case of professional faculties, 80% of a full program of study. Awards will be made only to those who continue their studies to the satisfaction of the Awards Office and may be withheld for unsatisfactory attendance or progress. Students who have completed at least one year of study at U.B.C. may be eligible to defer certain scholarships for one year, provided the student shows satisfactory reasons for postponing attendance. Application for deferment must be made to the Awards Office. Students wishing to take up an award deferred from a previous year must advise the Awards Office by July 1. Major graduate fellowships may not be deferred.
7. Scholarships awarded for achievement in a specific faculty or discipline are normally conditional upon the winner continuing studies in the same discipline during the following year. A course-change to an ineligible faculty or discipline will usually result in re-assignment of the award to another student.
8. Bursaries will be awarded on the basis of financial need.
9. If invested funds do not provide the necessary income for any endowed award, payment of the award may be reduced or the award withheld. The University does not guarantee the payment of any awards other than those from the funds of the University. The University reserves the right to withhold awards donated by individuals or organizations where the funds required have not actually been received.
10. The University prefers to administer awards that are made available without restrictions deemed to be discriminatory. It will administer awards that define, in terms acceptable to Senate, the eligibility of students to receive the award. Senate may decline awards containing criteria that it deems to be contrary to the interests of the University as an academic institution.
11. The Senate of The University of British Columbia reserves the right to change the terms governing an award, so that they may better meet new conditions, may more fully carry out the intentions of the donor, or maintain the usefulness of the benefaction. The rights so reserved shall be exercised by resolution of the Senate duly confirmed by the Board of Governors, provided always that a year's notice shall be given in Senate of any proposed change and that the donor or their representative, if known, shall be consulted about the proposed change.

REGULATIONS GOVERNING GRADUATE AWARDS

1. The fellowships offered are available only for full-time study and/or research leading to a higher degree in the Faculty of Graduate Studies at the University of British Columbia and will normally be paid if the recipient is in full-time study and/or research at the University on the payment dates. Full-time study means that the student may not commit more than **12 hours a week** of working time, including teaching assistant or research assistant duties, to matters other than the degree. Students whose programs require off-campus field work must submit a letter of authorization from the head of the department.
2. A fellowship recipient is not permitted to hold, simultaneously, other major fellowships or scholarships.
3. Students should note that the University does not deduct income tax from the fellowship awards, which are taxable in the hands of the recipient.
4. Board and room, and other fees are the responsibility of the student.
5. Subject to satisfactory standing and progress, full University Graduate Fellowships may be renewed for one further year. After one renewal, candidates who wish to apply for a further award must re-enter the competition. Partial University Graduate Fellowships and awards from the Hugo E. Meilicke Fund, and the Tina and Morris Wagner Foundation are for one year only.
6. Killam Fellowships are subject to the same terms of award as University Graduate Fellowships.

SCHOOL AND COLLEGE LIAISON OFFICE

The School and College Liaison Office provides information services and programs for counsellors and prospective UBC students from Canadian secondary schools and colleges. Counsellors and students with inquiries about undergraduate programs, admission requirements, awards and financial aid, student housing and other student services at UBC are encouraged to contact the Office.

Liaison Office representatives visit B.C. secondary schools and colleges each year to meet with prospective UBC students. The Office also arranges visits to UBC for groups of secondary school students on request from counsellors or teachers. Individual students can arrange to take a guided walking tour of campus most Fridays during the Winter Session by calling the Liaison Office. The Office also organizes an Orientation program on campus each summer for new students entering first year at UBC in the fall.

For information or assistance, please contact the School and College Liaison Office, The University of British Columbia, Brock Hall, 1874 East Mall, Vancouver, B.C., V6T 1W5. Telephone: 228-4319. The office is open from 8:30 a.m. to 4:30 p.m., Monday through Friday.

STUDENT COUNSELLING AND RESOURCES CENTRE

The Student Counselling and Resources Centre provides four types of service to the student body: (1) Counselling, (2) Testing, (3) Special Needs, and (4) Career Information and Resources. The Centre provides personal and career counselling on an individual or group basis to students registered at the University. Individually, students are able to discuss, in confidence with a professional counsellor, any matter that may be of concern to them. Such concerns may include adjustment difficulties, anxiety, emotional distress, depression, loneliness, assault, abuse (physical, sexual, chemical, or emotional), interpersonal relationships, family and marital issues, career choice and direction, and the barriers students may feel stand in the way of their academic success. On a group basis, the Centre provides workshops on issues of educational, career, and social concern.

Testing The Centre provides personality, career, and aptitude testing for students. In addition, an extensive program of entrance and professional school exams is administered by the Centre. All tests of a personal nature are administered in consultation with a counsellor. Students are able to arrange for testing by appointment with a counsellor. Entrance and professional school exams are scheduled at set times throughout the year.

Special Needs The Centre seeks to assist students in experiencing the full benefit of the University. While all students have the right to equal access to the services of the University, not all students experience the University environment equally. Special needs groups may include disabled, mature, international, and women students: the Centre seeks to provide specialized counselling services for students in these groups.

Services for disabled students are co-ordinated by the Centre. Included in these services is the loaning of specialized equipment, the coordination of arrangements for students needing specialized conditions for course examinations, registration, and the Students Helping Students program. Information on campus accessibility and general information on the assistance UBC offers disabled students with their education is provided through the Centre.

International students are served through the Centre's active liaison with International House. Workshops, discussion groups, and inter-cultural counselling are provided by the Centre. Students are assisted in adjusting to both our culture and the demands of the University's educational environment.

Career and Information Resources The Centre maintains a Career Resource Library. This area contains self-help, career, and educational information in a variety of forms, including books, files, audiotapes, videotapes, microfiche, previous course exams, and an extensive selection of university calendars from Canadian institutions and from institutions outside Canada.

In addition, the Centre houses **Volunteer Connections**, an organization which offers referral and information services to students seeking volunteer positions for career-related experience or personal development.

Appointments For an appointment, drop by the Counselling Centre in Brock Hall, Room 200, or phone 228-3811. Office hours are 8:30 a.m. to 4:30 p.m., Monday through Friday.

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 part time in the library are accepted in late August and the first week of September. The Centre is located in Room 214, Brock Hall. Office hours are 8:30 a.m. to 4:30 p.m. Monday through Friday.

OFFICE FOR WOMEN STUDENTS

The Office for Women Students counsels women students and prospective students with personal, educational, financial, 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 twelve child care programs on campus caring for children from birth to twelve years of age. All are independent non-profit parent run societies. The programs are popular so applications should be made early. Contact the Child Care Coordinator, 5590 Osoyoos Crescent, Vancouver, B.C., V6T 1X7 (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. The Housing Department's application process is entirely separate from the University's admissions system, so students should not wait until they are admitted to UBC before applying for housing. 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. Fax: (604) 228-6935. The office is open Monday to Friday, 8:30-4:00 and is closed on weekends and statutory holidays.

Family Accommodation

Five hundred and thirty-one unfurnished apartments and townhouses are available on a yearly tenancy basis in the Acadia Park development, for married students with or without 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 or at the Residence Front Desks. Personal interviews are necessary.

Additional On-Campus Accommodation

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

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

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 and the **Graduate Student Centre** also have listings on their notice boards of off-campus accommodation available to students.

THE STUDENT HEALTH SERVICE

1. The Student Health Service is located in the Acute Care Unit, University Hospital. Reception room is Main Floor Room M334, telephone number is 228-7011. Clinic hours are Monday, Tuesday, Wednesday and Friday 7:45 a.m. to 5:00 p.m., and Thursday 8:45 a.m. to 5:00 p.m. while Winter Session classes are scheduled, and from 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 University Hospital.

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 statement of illness obtained from a doctor **during** their illness. This statement must be in the hands of the Student Health Service within the current examination period. If appropriate, a medical certificate will be issued by the Student Health Service and copies forwarded to the Registrar and the Dean of the Faculty or Director of the School in which the student is registered.

(b) Students absent at other times during the session because of illness should report their absence to their instructors. A medical certificate from the Student Health Service is not normally needed but may be required by the Dean's Office where periods of absence significantly affect a student's course grades or ability to meet other program requirements.

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 residents at BCHIS office, Tel. No. 660-2406.

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.

(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 or her 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.

NON CANADIAN STUDENTS are strongly advised to have adequate hospital/sickness insurance coverage. A three-month coverage should be obtained, either in their country of origin or immediately upon arrival in British Columbia. After 3 months, those on either student or working visas may be eligible for the Medical Services Plan of British Columbia.

Application forms for medical insurance coverage are available at your Student Health Service and enquiries are always welcome. Please feel free to drop into the clinic when you arrive and meet our staff (see paragraph 1).

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 holds more than 8 million 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 and 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 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.

UNIVERSITY COMPUTING SERVICES

University Computing Services (UCS, formerly the Computing Centre), provides computing services and support to both UBC's academic and administrative communities.

The University computing environment is a diverse one, encompassing mainframes, workstations, local area networks and personal computers. Meeting the needs of the various users of these systems is the role of UCS.

UCS's services include data entry, managing the operation of the University's mainframe services, consultation, product evaluation, software support, documentation, and customer training for the various types of computers in use on campus, and the demonstration of micro-computer hardware and software.

UCS also manages full electronic mail services to the campus and beyond, linking UBC to major academic electronic mail networks worldwide.

To better inform the campus community of University computing developments and services, University Computing Services publishes a monthly newsletter, *Campus Computing*, which is available at no charge from the UCS Reception area, 4th floor, Computer Sciences Building.

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 community and regional planning, computer science, and family and nutritional sciences.
2. certificate and diploma programs in 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 to 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 a variety of 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 Test Workshops are designed for students in English 100 and others preparing for the UBC English Composition Test.

Courses begin in September, January, May 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 to the Reading, Writing and Study Skills Centre, Centre for Continuing Education, or telephone 222-5245.

English Language Institute (English as a Second Language)

The English Language Institute offers daytime and evening courses in English as a second language to students who wish to improve their ability in spoken and written English.

The Academic Preparation Program is a daytime program designed for students who wish to study at post-secondary institutions where instruction is given in English. The program is open to students who have not achieved the 570 TOEFL (580 for Arts) score required for admission to UBC. The Communication Program is a daytime program designed to improve the students' fluency and overall listening and speaking skills. Both the Academic Preparation and the Communication programs are offered four times per year.

The English Language Institute also offers the E.L.C.T. (English Language and Composition Training) Program for students who have been admitted to UBC but who are required to do additional work on the English language. This daytime course is five hours per week in the Fall and Winter terms. Evening programs are also offered in the Fall and Winter terms. Current evening course titles are Conversation Skills, Speech: Fluency and Pronunciation, Writing and Grammar, and TOEFL Preparation.

All courses offered by the English Language Institute are NON-CREDIT and do not guarantee admission to a university. For further information write or phone the English Language Institute, Centre for Continuing Education, 5997 Iona Drive, Vancouver, B.C. V6T 2A4; Telephone 222-5258; Fax: 222-5283.

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 eligible 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 the final three years of medical school and up to two years of 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 four 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
757 W. Hastings Street
Suite R125, Sinclair Centre
Vancouver, B.C. V6C 1A1
Tel.: 666-4192

THE UNIVERSITY BOOKSTORE

The UBC Bookstore, in its 55,000 sq. ft. premises on University Boulevard, and its Health Sciences Bookshop at 2720 Heather Street, 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. (The computer shop is closed on Wednesday evening and all day 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.

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.

Parking. Gated "B" lots provide inexpensive daily parking for all members of the University and parking permits are sold at the Traffic Office to allow faculty, students and staff members to park their vehicles in various registered-vehicle parking lots. Pay parking lots and parking meters are provided for campus 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 Alma Mater Society, the University sponsors an extensive Intercollegiate, Intramural and Recreational sports program. Students are encouraged to participate in the activities which best suit 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:

Athletic and Sport Services Office
Room 208, War Memorial Gym 228-2531
Intramurals 228-6000
66 Sub Plaza
Recreational Sports & Outdoor Rentals 228-3996
Fitness Centre, Room 203, War Memorial Gym
Tennis Centre 228-2505
Osborne Centre, South Campus

FACILITIES

War Memorial Gymnasium

The Memorial Gymnasium was officially dedicated on October 26, 1951 by Major-General Bertram M. Hoffmeister. 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 a fitness centre, Human Performance Laboratories, and offices of the School of Physical Education and Recreation and the Department of Athletics and Sport Services. The William Eugene MacInnes Field 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 80 acres and contains the Thunderbird Stadium, the Winter Sports Centre, the Wolfson I Fields, 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 Evelyn Lett Field, the Wolfson II Field, the Harry Logan Track, the John Owen Pavilion, 10 outdoor tennis courts and the Tennis Bubble which contains four indoor courts, and the Osborne Centre. The Arthur Lord Field, the Wolfson I Rugby Fields 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 Fields were developed as a result of a gift from the Wolfson Foundation, London, England, made through the British Columbia Playing Fields Association and in particular through the efforts of the late Sir Ouvry Roberts and of Dr. Harry Warren of the UBC Faculty, in close association with Mr. Robert Spray, President of the British Columbia Rugby Union.

The present Evelyn Lett Field, the O. J. Todd Field and the Wolfson II Field have been rebuilt on a new sand-cellular system that has proven to be revolutionary and successful since opening 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. It consists of two gymnasia (with floors of 75′ x 120′), locker rooms, and two classrooms.

Unit II, consisting of two gymnasia, locker rooms, and offices 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 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.

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 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 was opened on October 7, 1967 by Allan M. McGavin, C.D., Board of Governors. 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 by the Honourable John N. Turner, M.P., and was dedicated to the late Johnny Owen, former Trainer to the countless University athletic teams for over 20 years. In 1981 the Pavilion was relinquished by Athletics and underwent an extensive $250,000 upgrading and renovating program to facilitate the integration of a new and innovative concept that encompassed the School of Physical Education and Recreation, the Department of Family Practice and the Alan McGavin Sports Medicine Clinic. Further extension of the building was undertaken in 1987 in order to more adequately house the Alan McGavin Sports Medicine Centre.

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.

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, the School of Physical Education and Recreation, and the Department of Athletics and Sport Services.

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

COMMUNITY RELATIONS DEPARTMENT

This Office provides a comprehensive community relations program directed towards the campus community, the general public, government, industry and the media. The primary goals of the Office are to increase public understanding and support for the University, encourage public use of campus facilities and attractions, promote interaction between the University and the private and public sectors, and to keep the campus community informed about issues that affect it. The Office provides the news media with accurate and timely information about research activities and other matters of public interest, coordinates special events such as Open House, National Universities Week and MLA Days, and produces a wide range of publications, including President's Reports, a tabloid *It's Yours* circulated in the *Sun*, campus map, a visitors' brochure and the tabloid newspaper *UBC Reports*. Community Relations also provides public and media relations counselling to UBC administrative and academic units. The telephone number for Community Relations is 228-3131.

DEVELOPMENT OFFICE

The Development Office works to advance the goals of the University by increasing private funding to UBC. Individuals, corporations, foundations and service organizations contribute to UBC's development through annual and campaign gifts. Individual donors also contribute through bequests and other planned gifts. Monies raised are used for scholarships, endowed chairs, library acquisitions, equipment and other academic projects.

Donors who contribute $1,000 or more annually are members of **The Wesbrook Society**, UBC's giving club. Membership includes invitations to special events, library privileges and other campus benefits.

In 1989, the University launched **The UBC Campaign, A World of Opportunity** to raise $132 million for development. The Government of British Columbia will contribute $66 million to match private gifts to the campaign. The three-year campaign will be managed by the Development Office, in conjunction with a volunteer committee of senior business leaders.

For more information about gifts to UBC, call the Development Office at 222-8900.

PERSONNEL SERVICES

The Department of Personnel Services has responsibility for personnel and labour relations of the non-faculty staff (including teaching assistants) of the University.

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

FOOD SERVICES

The **Food Services Administration 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 4:30 p.m.

The following Food Service operations are located throughout the campus.

Subway Cafeteria — UBC's largest cafeteria is conveniently located on the main level of the Student Union Building. An extensive menu selection includes salad bar, sandwich bar, omelette bar, pasta & pizza specialties, grill items, beverages, snacks, bakery items and daily specials. 228-3461.

Dial-a-Menu — for up-to-date menu information including daily specials and features call Dial-a-Menu at 228-6060.

Bus Stop Coffee Shop — located in the centre of campus on Main Mall. Enjoy the efficient friendly waitress service for which the Bus Stop is famous. Short order menu and daily specials featured. **The Express** — located next to the Bus Stop, has an extensive menu for snacks, beverages and deli items. 228-3256.

I.R.C. Snack Bar — located at the East end of the lounge in the Instructional Resource Centre. Efficient staff serve beverages, bakery items, sandwiches and hot soups. 228-4291.

Yum Yums — located in the basement of the Old Auditorium building specializes in authentic and reasonably priced Chinese food. Full snack bar service including salad bar, grill and sandwich bar is also available. Beer and wine served. 228-2569.

The Barn — located at the South end of Main Mall. Full snack bar menu and grill items featured. Cosy atmosphere inside and, weather permitting, there is a sunny outdoor patio. 228-3651.

Arts 200 — located in the Buchanan Lounge. Convenient service for beverages, bakery items, hot soups and sandwiches. 228-2002.

Edibles — located on the lower level of the Scarfe (Education) Building. Full snack bar menu featured including grill items. Friendly, intimate and warm atmosphere to meet colleagues and friends for a coffee break, lunch or early supper. 228-6258.

Roots — a new snack bar service located in the MacMillan Building lounge in the heart of Forestry and Aggie land.

The Underground — located in the Sedgewick Library, open Sunday to Friday. Extensive snack bar menu including custom sandwich bar. 228-6867.

Graduate Student Centre — enjoy a panoramic view of Burrard Inlet and the mountains in the Fireside Lounge. Lunch served 11:00 a.m. to 2:00 p.m. Licensed facilities. 228-2868.

Special Catering Service — the Catering Office is located in the Graduate Student Centre on Crescent Road. Service available for all campus catering needs including coffee breaks, luncheons, banquets, teas, receptions, weddings, and wine and cheese parties. For more information, please call 228-2018.

PUBLICATIONS

The University of British Columbia Press

The University of British Columbia Press was founded in 1971 in the spirit of other great scholarly presses to contribute to the dissemination and preservation of learning, education and culture in Canada and throughout the world. To this end, it publishes works written not only by UBC faculty but also by faculty from other Canadian and non-Canadian universities and by non-academic authorities in their fields.

Recently published books include: *The New Geopolitics of Minerals*, edited by David G. Haglund; *Assu of Cape Mudge*, by Harry Assu with Joy Inglis; *A White Man's Province*, by Patricia E. Roy; *Canadian Oceans Policy*, edited by Donald McRae and Gordon Munro; *Chiefs of The Sea and Sky*, by George F. MacDonald; *The Canadian Yearbook of International Law, Volume XXVI, 1988*, edited by C. B. Bourne; *The Political Economy of Pensions*, by Richard Lee Deaton; *Robert Brown and The Vancouver Island Exploring Expedition*, edited by John Hayman; *Indicator Plants of Coastal British Columbia*, by A. Klinka, V. J. Krajina, A. Ceska, and A. M. Scagel; and *Co-operative Management of Local Fisheries*, edited by Evelyn Pinkerton.

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
6344 Memorial Road, Vancouver, B.C., Canada
V6T 1W5
Tel. (604) 228-5042 or 228-4546
Fax (604) 228-6083

Pacific Affairs

Edited by Ian D. Slater

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, an award-winning quarterly, 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 book reviews and a comprehensive bibliography of recently published material relating to B.C.

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

Blair Rosser, Editor
Heidi Neufeld-Raine, Executive Editor
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: one year $12.00, two years $20. Annual Short Fiction Contest: deadline December 1st of each year, first prize $2,000.00.

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

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.
Margaret Stott, M.A. (McGill), Ph.D. (London School of Economics), Curator of Ethnology/Education.
David Pokotylo, B.A. (Winnipeg), M.A. (Manitoba), Ph.D. (Brit. Col.), Assistant Professor, Curator of Archaeology.
Miriam Clavir, B.A. (Toronto), M.A. (Queen's), Honorary Lecturer.

The **Museum of Anthropology** was founded in 1947 and now contains about 80,000 archaeological artifacts and 30,000 ethnographic artifacts. Of these, the Northwest Coast collection is outstanding, consisting of a broad ethnographic

range of 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 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, the Japanese Association of Prefectural Governments, and Dr. and Mrs. Miguel Tecson.

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, South America and Central Asia represent the arts of these regions. A major donation of European ceramics by Dr. Walter Koerner will be added in 1990.

Collections from North American Indian cultures are reasonably extensive and the Inuit material from the Coppermine River area, much of which was collected by Michell Pierce in 1930, is excellent. The Inuit collections have grown substantially through recent acquisitions.

These collections are used in teaching, especially in museum training courses, and in various anthropology courses as well as courses in other disciplines. They are also resources for research work by students and scholars.

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 spectacular building enhances the Museum's collection of massive carvings of the Northwest Coast, and permits the public display of most of its ethnographic collections in the visible storage galleries.

The operations of the Museum are funded in part by the Museum Assistance Program of Communications Canada, and by the Government of British Columbia, through the Ministry of Municipal Affairs, Recreation and Culture.

The Museum is located at 6393 N.W. Marine Drive.

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, located on the first floor of the Geological Sciences Centre, 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. A collector shop carries a superb assortment of minerals and fossils for collectors. 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.

R. J. Belland, B.Sc. (Alberta), M.Sc., Ph.D. (Memorial), Asst. Curator of the Bryophyte Collections.

T. Goward, B.A. (Mt. Allison), Asst. Curator of the Lichen Collections.

H. Kennedy, B.S., M.S., Ph.D. (U. California, Davis), Asst. 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. B. Straley, B.S. (Virginia Polytech.), M.S. (Ohio), Ph.D. (Brit. Col.), Acting Curator of Vascular Plant 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 200,000 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 72,000 specimens of marine algae. They are rich in species from British Columbia, Washington, Oregon, Alaska and major representations from Australia, New Zealand, Europe, Japan and South Africa. 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 35,000 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 196,000 specimens, of which over 163,000 are mosses and 33,000 are hepatics, and the lichen collections contain over 23,000 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 500,000 specimens mostly from British Columbia and the Yukon. 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), Director.

E. P. Simons, B.Sc., M.Sc. (Calgary), 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 352 isolates (213 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 97 isolates (53 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).

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 6804 S.W. Marine Drive.

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 also dedicated. It contains an outstanding collection of over 400 species of Rhododendrons, along with a good collection of woody and herbaceous plants from Asia.

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 Library, the Institute of Asian Research, the Department of Asian Studies, and provides space for the Asian interests of the School of Music.

The Asian Centre has an auditorium seating up to 220 people, a music performance studio with seating capacity of 120, meeting rooms, and a Japanese Tea Gallery. These facilities can be made available to both university and public groups concerned with Asia. To book these areas call 228-2746. The building is open during the regular hours of the Asian 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: Scott Watson
Assistant: Mary Williams

The Fine Arts Gallery is located in the basement of the North Wing of the Main Library Building. 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 which confirm the creative and eclectic aspects of contemporary 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. The A.M.S. is governed by the Students' Council which is composed of a five member Executive, representatives from the faculties and schools, 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 to represent all students at the different levels of Administration and Government.

The offices of the Alma Mater Society are located in the north west corner of the second floor of the Student Union Building. Tel. 228-2901.

Student Administrative Commission

The Student Administrative Commission (S.A.C.) is the administrative arm of the A.M.S. S.A.C. is 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 overseeing student elections, S.U.B. Security, the A.M.S. Art Gallery and Clubs Days.

S.A.C. is chaired by the A.M.S. Director of Administration and is comprised of one Secretary and nine Commissioners who are appointed by the Student Council Selections Committee in October and February of each year.

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 SUB expansion contains 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, and a desktop publishing service.

The original SUB contains rooms of various sizes and uses. These range from a large ballroom to small conference rooms, to seminar rooms, to club areas (photography studios and darkroom, radio station, dive shop, pottery and graphic studios, newspaper). Special facilities include recreation areas (billiards, pub, lounge), commercial areas (delicatessen, bank, college shop, travel service, copy centre, and ticket-centre), 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.

SUB is managed by the AMS Student Administrative Commission.

Publications

The Alma Mater Society publishes twice weekly the student newspaper "The Ubyssey". "Inside UBC", an orientation publication, student handbook and calendar of events, is published by the A.M.S. and distributed during the first week of lectures in September. Additional publications are: the "Discorder", the "CITR — UBC Radio Program Guide", the "Competition" — the UBC Sport Services Newspaper, and several constituent society newsletters and journals of interest to members.

University Clubs and Associations

Clubs and associations on campus are subsidiaries of the Alma Mater Society.

There are currently over 225 clubs and associations on campus and information can be obtained from the A.M.S. Business Office, located on the second floor of SUB. Tel. 228-2901.

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:

Executive Committee

President: Ann Pickard McAfee, B.A. '62, M.A. '67, Ph.D. '75.
Past President: John Diggens, B.Sc. '68, D.M.D. '72.
Treasurer: Mark Hilton, B.Com. '83, LL.B. '88.
Executive Director, U.B.C. Alumni Association: Deborah Apps.

Members-at-Large (1988-90)

Godwin Eni, M.Sc. '81, Ph.D. '87.
Oscar Sziklai, M.F. '61, Ph.D. '64, B.S.F. (Sopron).
Janet Gavinchuk, B.Com. '77, MBA '86.

Members-at-Large (1989-91)

Janet Calder, B.A.Sc. '74.
Martin Cocking, B.A. '87.
Curt Latham, B.A. '58, M.D. '62.

Appointed Members

Awards Chair: John Diggens, B.Sc. '68, D.M.D. '72.
Divisions Chair: Jim Stich, B.Sc. '71, D.M.D. '75.
Marketing Chair: Ralph McRae, B.Com. '80, LL.B. '81.

Alma Mater Society Representative

Michael Lee, President.

Faculty Association Representative

Kenneth Stoddart

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 120,000 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.

The Association is responsible for the administration of 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 Association sponsors a wide range of activities including reunions, student events, programs for graduates of specific faculties and events for alumni living in Canadian and foreign cities. 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

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.
K. D. Srivastava, B.Sc. (Agra), B.E. (Roorkee), Ph.D. (Glasgow), University Professor Honoris Causa (Paraiba), C.Eng. (U.K.), P.Eng. (Ont.), F.I.E.E.E., F.I.E.E., Vice-President Student and Academic Services.

Chairman of the Board of Directors

Carola Mansfield.

Executive Director, Acting

Iris V. Thomson, B.A., M.Ed.

The Rotary Club of Vancouver Representative

Brice McDougall.

Rotary Club of Vancouver South Representative

Harvey White.

International House is a centre for both international and Canadian students as well as faculty and members of the community. Services for international students include pre-departure information, reception, arranging of temporary accommodation, an initial orientation program, a peer program, liaison with and referral to campus, government and community agencies and departments, support and advice on all matters of concern and re-entry programs. Other services include a Work and Study Abroad Information Library, a Language Exchange Program and a Language Bank. Membership is open to all.

B.C. RESEARCH

B.C. Research is an independent industrial research corporation, 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 waste management, fisheries and food, forest biotechnology, analytical chemistry, occupational health, specialty products and processes, ocean engineering, engine systems and alternative fuels, integrated engineering services and business development.

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 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 140, of which 100 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.

(PAPRICAN) 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 360. 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 program at UBC is housed in the Pulp and Paper Centre.

PULP AND PAPER CENTRE

The Centre houses collaborative research and teaching programs between the University of British Columbia and the Pulp and Paper Research Institute of Canada (PAPRICAN). Affiliates of the Centre drawn from University faculty and PAPRICAN staff supervise graduate student research in a variety of engineering fields. The Pulp and Paper Master of Engineering teaching program is also located in the Centre. These academic activities are linked to the Industry through PAPRICAN's post-graduate program begun more than sixty years ago at McGill University.

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: Mr. Doug Johnston, Cert. Min. (Baptist), Rev. Ray Schultz, B.A., M.Div. (Lutheran), Mr. Robert Powell, B.Sc., M.Div. (Pentecostal Assemblies of Canada), Rev. Leo J. Klosterman, Ph.D., C.S.V., Rev. Paul Burns, Ph.D., C.S.V., Sister Marina Smith, B.Ed., M.Ed., Rev. Edward Heidt, B.A., M.Sc., M.Div., Ph.D. (Roman Catholic), Dr. Mordehai Wosk (Jewish), Rev. Brad Newcombe, B.S.L., B.Th., S.T.M. (United), Rev. Palmer Becker, B.A., M.R.E. (Mennonite), Dr. Victor Sokolof, Ph.D. (Orthodox), Rev. Bud Raymond (Anglican), Ms. Brenda Stevens, M.S.W. (Student Family Services).

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 therefore 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.

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

REV. LEO J. KLOSTERMAN, C.S.B., B.Sc., M.S., Ph.D.

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

President

WALTER C. WRIGHT, JR., B.A., M.Div., Ph.D.

The College is an autonomous body, trans-denominational in character and evangelical and Biblical in basis. Regent College offers graduate level 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 one, two and three-week periods as well as a seven-week intensive Hebrew and Greek-Language Session are held each year. The College has formal affiliation with the University, and is a full member of The Association of Theological Schools in the U.S.A. and Canada.

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 and women's residence provides on-campus dormitory, dining-room and chapel facilities for 41 students during winter sessions. Application forms should be requested and filed well in advance. Summer accommodation — room only with self-catering kitchen available — May 1 - August 31.

Carey Hall

(Canadian Baptist Federation)

Principal/Director, Field Education

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

Faculty Members

ROY D. BELL, B.Div., M.Ed., D.Min, D.D., Ordained Minister,
Registered Psychologist
The Chair of Family Ministries

STANLEY J. GRENZ, B.A., M.Div., D.Th., Ordained Minister,
Professor, Pioneer McDonald Chair at Baptist Heritage,
Theology and Ethics

R. PAUL STEVENS, B.A., B.D., D.Min. Ordained Minister,
Associate Professor: Applied Theology

JOHN C. ZIMMERMAN, A.B., M.Div., D.Min. Ordained Minister,
Charles Bentall Professor of Pastoral 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 cooperation with Regent College in terms of the M.Div.

ENROLMENT 1989-90
(as at November 1, 1989)

	Regular Session M	Regular Session F	Extrasessional Credit Courses M	Extrasessional Credit Courses F	Total
FACULTY OF AGRICULTURAL SCIENCES					
First Year	17	44	—	—	61
Second Year	24	40	—	—	64
Third Year	26	35	—	—	61
Fourth Year	31	33	—	—	64
Total	98	152	—	—	250
Landscape Architecture					
First Year	14	8	—	—	22
Second Year	14	9	—	—	23
Third Year	9	9	—	—	18
Fourth Year	7	5	—	—	12
Total	44	31	—	—	75
TOTAL IN FACULTY	142	183	—	—	325
FACULTY OF APPLIED SCIENCE					
Engineering					
First Year	389	55	—	—	444
Second Year	397	41	—	—	438
Third Year	325	34	1	—	360
Fourth Year	362	38	—	—	400
Fifth Year	29	3	—	—	32
Total	1,502	171	1	—	1,674
School of Architecture					
First Year	36	17	—	—	53
Second Year	31	20	—	—	51
Third Year	31	11	—	—	42
Total	98	48	—	—	146
School of Nursing					
First Year	5	129	—	—	134
Second Year	2	86	—	—	88
Third Year	7	121	—	1	129
Fourth Year	3	116	—	—	119
Total	17	452	—	1	470
TOTAL IN FACULTY	1,617	671	1	1	2,290
FACULTY OF ARTS					
Arts					
First Year	591	1,015	8	30	1,644
Second Year	637	1,119	6	31	1,793
Third Year	735	1,185	15	27	1,962
Fourth Year	692	1,029	21	27	1,769
Total	2,655	4,348	50	115	7,168
Fine Arts					
Second Year	13	10	—	—	23
Third Year	18	35	—	—	53
Fourth Year	21	36	—	2	59
Total	52	81	—	2	135
Music					
First Year	17	26	—	—	43
Second Year	18	29	—	—	47
Third Year	31	46	—	—	77
Fourth Year	31	42	—	—	73
Fifth Year	1	—	—	—	1
Total	98	143	—	—	241
School of Family and Nutritional Sciences					
First Year	1	18	—	1	20
Second Year	6	43	—	1	50
Third Year	2	71	—	—	73
Fourth Year	5	59	—	—	64
Fifth Year	—	2	—	—	2
Total	14	193	—	2	209
School of Library, Archival and Information Studies					
Library Science					
First Year	11	33	—	—	44
Second Year	6	35	—	—	41
Total	17	68	—	—	85
Archival Studies					
First Year	6	6	—	—	12
Second Year	2	8	—	—	10
Total	8	14	—	—	22
School of Social Work					
Third Year	5	29	—	—	34
Fourth Year	11	24	—	—	35
Fifth Year	19	68	—	—	87
Total	35	121	—	—	156
Diploma Programs					
Applied Creative Non-fiction	1	2	—	—	3
Applied Linguistics	—	2	—	—	2
Art History	5	17	—	1	23
Film/T.V. Studies	4	9	—	1	14
French Translation	2	13	—	—	15
Total	12	43	—	2	57
TOTAL IN FACULTY	2,891	5,011	50	121	8,073
FACULTY OF COMMERCE AND BUSINESS ADMINISTRATION					
Second Year (new program)	247	170	—	—	417
Third Year (new program)	251	193	—	—	444
Fourth Year (new program)	215	158	—	—	373
Third Year (old program)	2	1	—	—	3
Fourth Year (old program)	193	146	1	—	340
TOTAL IN FACULTY	908	668	1	—	1,577
FACULTY OF DENTISTRY					
Dentistry					
First Year	25	15	—	—	40
Second Year	31	10	—	—	41
Third Year	21	17	—	—	38
Fourth Year	28	11	—	—	39
Total	105	53	—	—	158
Post Graduate Specialty Training	2	—	—	—	2
Dental Residents	8	1	—	—	9
TOTAL IN FACULTY	115	54	—	—	169
FACULTY OF EDUCATION					
Elementary (new program)					
First Year	73	232	—	—	305
Second Year	58	157	1	—	216
Total	131	389	1	—	521
Elementary (old program)					
Third Year	1	14	—	2	17
Fourth Year	7	113	—	28	148
Total	8	127	—	30	165
Elementary (NITEP)					
First Year	8	45	—	—	53
Second Year	—	11	—	—	11
Third Year	4	12	—	1	17
Fourth Year	3	13	—	—	16
Total	15	81	—	1	97
Secondary (new program)					
First Year	163	114	—	—	277
Second Year	8	11	2	1	22
Total	171	125	2	1	299

	Regular Session		Extrasessional Credit Courses		Total
	M	F	M	F	
Secondary (old program)					
Third Year	2	—	—	—	2
Fourth Year	16	4	4	—	24
Fifth Year	21	18	—	—	39
Graduates	2	2	—	—	4
Total	41	24	4	—	69
Diploma Programs	88	367	18	76	549
Certification Only	55	209	8	43	315
School of Physical Education and Recreation:					
Physical Education					
First Year	50	32	—	—	82
Second Year	84	78	—	—	162
Third Year	132	94	—	1	227
Fourth Year	95	85	1	—	181
Total	361	289	1	1	652
Recreation Education					
Fourth Year	2	—	—	2	4
Total	2	—	—	2	4
TOTAL IN FACULTY	872	1,611	34	154	2,671
FACULTY OF FORESTRY					
First Year	41	7	—	—	48
Second Year	64	6	—	—	70
Third Year	44	8	—	—	52
Fourth Year	52	14	—	—	66
TOTAL IN FACULTY	201	35	—	—	236
FACULTY OF GRADUATE STUDIES					
Ph.D.					
Agricultural Sciences	28	20	—	—	48
Applied Science	160	13	—	—	173
Arts	148	150	—	—	298
Commerce and Business Administration	48	21	—	—	69
Community and Regional Planning	7	4	—	—	11
Dentistry	8	2	—	—	10
Education	14	16	—	—	30
Family and Nutritional Sciences	—	4	—	—	4
Forestry	38	11	—	—	49
Medicine	55	38	—	—	93
Music	8	2	—	—	10
Pharmaceutical Sciences	16	4	—	—	20
Science	387	117	—	—	504
Total	917	402	—	—	1,319
Ed.D.	47	78	—	—	125
D.M.A.	13	6	—	—	19
M.A.					
Arts	185	227	—	—	412
Community and Regional Planning	43	39	—	—	82
Education	90	237	—	—	327
Total	318	503	—	—	821
M.Sc.					
Agricultural Sciences	57	44	—	—	101
Applied Science	3	2	—	—	5
Combined M.Sc./ Dip. in Periodontics	1	1	—	—	2
Commerce and Business Administration	26	13	—	—	39
Community and Regional Planning	11	7	—	—	18
Dental Science	4	3	—	—	7
Family and Nutritional Sciences	1	9	—	—	10
Forestry	31	12	—	—	43
Medicine	48	85	—	—	133
Pharmaceutical Sciences	8	9	—	—	17
Science	226	118	—	—	344
Total	416	303	—	—	719
M.F.A.	34	26	—	—	60
M.H.Sc.	11	9	—	—	20
M.Mus.	11	9	—	—	20
M.A.Sc.	186	30	—	—	216
M.A.S.A.	4	2	—	—	6
M.Eng.	44	3	—	—	47
M.S.N.	2	99	—	—	101
M.B.A.	237	117	—	—	354
M.B.A/LL.B.	5	1	—	—	6
M.F.	12	1	—	—	13
M.Ed.	97	309	—	—	406
M.P.E.	20	26	—	—	46
LL.M.	15	13	—	—	28
M.S.W.	23	59	—	—	82
TOTAL IN FACULTY	2,412	1,996	—	—	4,408
FACULTY OF LAW					
First Year	124	110	—	—	234
Second Year	103	116	—	—	219
Third Year	120	101	—	—	221
TOTAL IN FACULTY	347	327	—	—	674
FACULTY OF MEDICINE					
First Year	67	54	—	—	121
Second Year	75	46	—	—	121
Third Year	69	54	—	—	123
Fourth Year	70	45	—	—	115
Total	281	199	—	—	480
Medical Residents	278	146	—	—	424
Medical Laboratory Science					
Third Year	10	16	—	—	26
Fourth Year	5	15	—	—	20
Total	15	31	—	—	46
School of Rehabilitation Medicine					
Second Year	14	53	—	—	67
Third Year	8	50	—	—	58
Fourth Year	5	40	—	—	45
Total	27	143	—	—	170
TOTAL IN FACULTY	601	519	—	—	1,120
FACULTY OF PHARMACEUTICAL SCIENCES					
First Year	34	41	—	—	75
Second Year	53	65	—	—	118
Third Year	54	68	—	—	122
Fourth Year	63	60	—	—	123
TOTAL IN FACULTY	204	234	—	—	438
FACULTY OF SCIENCE					
First Year	798	533	1	5	1,337
Second Year	639	422	2	—	1,063
Third Year	498	281	2	—	781
Fourth Year	557	292	—	1	850
Diploma in Meteorology	5	—	—	—	5
TOTAL IN FACULTY	2,497	1,528	5	6	4,036
Qualifying Year	16	16	1	2	35
Unclassified	350	499	47	88	984
Auditors	6	13	1	1	21
Senior Citizens	41	37	2	2	82
Total	413	565	51	93	1,122
TOTAL WINTER SESSION	13,220	13,402	142	375	27,139
	26,662		517		
Guided Independent Study	—	—	419	903	1,322
Summer Session 1989	2,234	2,118	—	—	4,352
Spring Session 1989	—	—	2,099	2,076	4,175
GRAND TOTAL 1989-90	15,454	15,520	2,660	3,354	36,988

DEGREES CONFERRED
1989

Spring:

Ph.D.—80; Ed.D.—8; D.M.A.—1; M.A.S.A.—2; M.A.Sc.—33; M.A.—57; M.A.(Planning)—5; M.B.A.—112; M.Sc.(Bus. Admin.)—7; M.Ed.—42; M.Eng.—13; M.F.A.—2; M.F.—2; M.H.Sc.—2; LL.M.—2; M.Mus.—13; M.P.E.—5; M.Sc.—76; M.Sc.(Planning)—2; M.S.N.—9; M.S.W.—6; M.A.S.—1; M.L.S.—48; B.A.Sc.—293; B.Arch.—21; B.A.—1,018; B.Com.—405; D.M.D.—40; B.Ed.—302; B.F.A.—31; B.H.E.—10; LL.B.—219; M.D.—122; B.M.L.Sc.—14; B.Mus.—41; B.S.N.—106; B.P.E.—70; B.R.E.—4; B.Sc.—597; B.Sc.(Agr.)—66; B.L.A.—9; B.Sc.(Dietet.)—44; B.S.F.—27; B.Sc.(Forestry)—4; B.Sc.(Pharm.)—91; B.Sc.(O.T.)—22; B.Sc.(P.T.)—23; B.S.W.—82; Total—4,189

Fall:

Ph.D.—109; Ed.D.—12; D.M.A.—1; M.A.S.A.—3; M.A.Sc.—47; M.A.—132; M.A.(Planning)—12; M.B.A.—23; M.Sc.(Bus. Admin.)—5; M.Ed.—127; M.Eng.—14; M.F.A.—18; M.H.Sc.—5; LL.M.—5; M.Mus.—2; M.P.E.—9; M.Sc.—105; M.Sc.(Planning)—1; M.S.N.—11; M.S.W.—25; M.A.S.—3; M.L.S.—2; B.A.Sc.—31; B.Arch.—6; B.A.—188; B.Com.—14; B.Ed.—109; B.F.A.—4; LL.B.—4; M.D.—1; B.M.L.Sc.—1; B.Mus.—6; B.S.N.—12; B.P.E.—18; B.R.E.—2; B.Sc.—46; B.Sc.(Agr.)—3; B.L.A.—4; B.S.F.—6; B.Sc.(P.T.)—2; B.S.W.—3; Total—1,131

DIPLOMAS GRANTED

	1989	
	Spring	**Fall**
Applied Linguistics	2	2
Art History	—	7
Education	88	138
Film and TV Studies	1	—
French Translation	—	5
Meteorology	3	—
Periodontics	—	1
Total	94	153

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
R. R. BARICHELLO, B.Sc. (Agr.) (Brit. Col.), A.M., Ph.D. (Chicago), Associate Professor and Head.
J. D. GRAHAM, M.Sc. (Natal), Ph.D. (Purdue), Associate Professor.
T. J. HAZLEDINE, B.A. (Canterbury), M.A. (Otago), Ph.D. (Warwick), Associate Professor.
G. KENNEDY, B.A. (Brit. Col.), M.Sc. (Minn.), Ph.D. (Purdue), Associate Professor.
G. C. VAN KOOTEN, B.Sc., M.A. (Alta.), Ph.D. (Oregon State), Associate 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.
R. M. BEAMES, M.Agr.Sc. (Queensland), Ph.D. (McGill), P.Ag., Professor.
C. R. KRISHNAMURTI, M.V.Sc. (Madras), Ph.D. (Alta.), P.Ag., Professor.
BERYL E. MARCH, B.A., M.S.A., D.Sc. (Honoris causa) (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.
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.
LESLIE E. HART, B.Sc. (Sydney), Ph.D. (Wisconsin-Madison), Assistant Professor.
G. K. IWAMA, M.Sc., Ph.D. (Brit. Col.), Assistant Professor.
R. RAJAMAHENDRAN, B.V.Sc. (Ceylon), M.Sc., Ph.D. (McGill), 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.) M.Sc. (Aberdeen) Ph.D. (Brit. Col.), Adjunct Professor.
L. J. FISHER, M.Sc. (Sask.), Ph.D. (Cornell), Adjunct Professor.
E. E. GARDINER, B.S. (Maine), M.S., Ph.D. (Purdue), Adjunct Professor.
D. A. HIGGS, B.Sc. (Victoria), B.Sc., Ph.D. (Manit.), Adjunct Professor.
J. R. HUNT, B.S.A. (Brit. Col.), Ph.D. (Washington State), Adjunct Professor.
E. D. LANE, M.Sc. (Brit. Col.), Ph.D. (Texas), Adjunct Professor.
J. A. LOVE, B.V.M.S. (Glasgow), M.R.C.V.S. (U.K.), Ph.D. (Tor.), Adjunct Professor.
B. D. MASON, B.Sc., Ph.D. (Brit. Col.), Adjunct Professor.
J. H. ROBINSON, D.V.M. (Wash.), M.S., Ph.D. (Wisconsin), Adjunct Professor.
E. TOLKSDORFF, D.V.M. (Germany) Dipl. Surgery Vet.Med. (Guelph), Adjunct Professor.

Department of Bio-Resource Engineering
K. VICTOR LO, B.S. (Taiwan), M.S. (Hawaii), Ph.D. (Massachusetts), P.Eng., Professor and Head.
LEONARD M. STALEY, B.A.Sc. (Brit. Col.), M.Sc. (Calif.), 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., Associate Professor.
A. K. P. LAU, B.Sc., M.Sc. (Guelph), Ph.D. (Brit. Col.), Assistant Professor.
R. J. PETRELL, B.Sc. (Minn.), M.Sc. (Penn. State), Ph.D. (Florida), Assistant Professor.
P. F. RICHARD, B.Sc., M.Sc. (McGill), Ph.D. (Brit. Col.), Assistant 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.
A. LEIGH MOYLS, B.A.Sc. (Brit. Col.), M.S., Ph.D. (Calif. I.T.), Adjunct Professor.

Department of Food Science
J. VANDERSTOEP, M.S.A., Ph.D. (Brit. Col.). P.Ag., Associate Professor and Acting Head.
S. NAKAI, B.Sc., Ph.D. (Tokyo), Professor.
W. D. POWRIE, M.A. (Toronto), Ph.D. (Massachusetts), F.I.F.T., Professor F.C.I.C., F.C.I.F.S.T.
J. F. RICHARDS, M.Sc. (Manit.), Ph.D. (Minn.), P.Ag., Professor and Dean.
P. M. TOWNSLEY, B.S.A. (Brit. Col.), M.S., Ph.D. (Calif.), 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.
T.D. DURANCE, M.Sc., Ph.D. (Brit. Col.), Assistant Professor.
D. D. KITTS, M.Sc., Ph.D. (Brit. Col.), Assistant Professor.
T. BEVERIDGE, M.Sc., Ph.D. (Brit. Col.), Adjunct Professor.
D. B. CUMMING, M.Sc. (Guelph), Ph.D. (Brit. Col.), Adjunct Professor.
T. E. HOWARD, B.Sc. (Southampton), Ph.D. (Strathclyde), Adjunct Professor.
J. C. MUELLER, Dipl. Ing. Agr., D.Sc. Tech (Swiss Fed.), Adjunct Professor.
G. A. STRASDINE, M.Sc., Ph.D. (Brit. Col.), Adjunct Professor.
M. A. TUNG, M.S.A., Ph.D. (Brit. Col.), Adjunct Professor.
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
B. E. ELLIS, B.Sc. (New Brunswick), Ph.D. (Brit. Col.), Professor and Head.
G. W. EATON, B.S.A. (Toronto), Ph.D. (Ohio State), P.Ag., Professor of Horticulture.
M. SHAW, M.Sc., Ph.D, D.Sc. (McGill), P.Ag., F.A.P.S., F.R.S.C., University Professor of Agricultural Botany.
P. A. JOLLIFFE, B.Sc. (Queen's), Ph.D. (Brit. Col.), Professor.
JUDITH H. MYERS, B.Sc. (Chatham Coll.). M.S. (Tufts), Ph.D. (Indiana), Professor.
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.
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.
M. B. ISMAN, B.Sc., M.Sc. (Brit. Col.), Ph.D. (Calif., Davis), Associate Professor.
D. D. PATERSON, B.Sc. (Manitoba), M.L.A. (Michigan), Associate Professor Landscape Architecture, and Director, B.L.A. Program.
M. D. PITT, M.S., Ph.D. (Calif.), Associate Professor.
M. K. UPADHYAYA, B.Sc. (Ag.) (Jawaharlal Nehru Agric.), M.Sc. (Indian Agric. Res. Inst.), M.A. (Princeton), Ph.D. (Michigan), Associate Professor.
J. W. KRONSTAD, B.S. (Oregon State), M.S., Ph.D. (Washington), Assistant Professor.
J. McPHERSON, B.Sc. (Bath), Ph.D. (Bristol), Assistant Professor.
P. F. MOONEY, B.Mus. (Brit. Col.), M.L.A. (Guelph), Assistant Professor of Landscape Architecture.
MOURA QUAYLE, B.L.A. (Guelph), M.L.A. (Calif., Berkeley), Assistant Professor of Landscape Architecture.

H. A. DAUBENY, B.S.A., M.S.A. (Brit. Col.), Ph.D. (Cornell), Adjunct Professor.
S. H. DEBOER. B.Sc., M.Sc. (Brit. Col.), Ph.D. (Wisconsin), Adjunct Professor.
A. R. FORBES, B.A. (Brit. Col.), M.S. (Oregon State), Ph.D. (Calif.), Adjunct Professor.
B. FRAZER, B.Sc. (Brit. Col.), 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.
H. KENNEDY, B.S., M.S., Ph.D. (Calif., Davis), Adjunct Professor.
N. E. LOONEY, B.S., Ph.D. (Washington State), Adjunct Professor.
R. R. MARTIN, B.S. (For.), Ph.D. (Wisconsin), Adjunct Professor.
A. McLEAN, B.S.A. (Brit. Col.), M.Sc. (Utah State), Ph.D. (Washington State), Adjunct Professor.
D. M. ROCHON, B.A., M.S., Ph.D. (Wayne State), Adjunct Professor.
R. STACE-SMITH, B.S.A. (Brit. Col.), Ph.D. (Oregon State). Adjunct Professor.
G. B. STRALEY, B.Sc. (Virginia Polytechnic & State), M.Sc. (Ohio), Ph.D. (Brit. Col.), Adjunct Professor.
J. H. TREMAINE, M.Sc. (McMaster), Ph.D. (Pittsburgh), Adjunct Professor.
T. C. VRAIN, M.S.V. (Caen), Ph.D. (North Carolina State), Adjunct Professor.
J. LOSEE, B.L.A. (Wash. State), Sessional Lecturer (part-time).
A. B. MacDONALD, B.Sc. (London), Sessional Lecturer (part-time).
R. K. PERRY, B.L.A. (E. Wash. State Coll.), Sessional Lecturer (part-time).
N. P. WENDT, B.L.A. (Oregon), Sessional Lecturer (part-time).
A. P. WHARTON, B.Sc. (North Wales), Sessional Lecturer (part-time).
H. R. MacCARTHY, B.A. (Brit. Col.), Ph.D. (Calif.), Honorary Lecturer.
H. S. PEPIN, B.S.A., M.A. (Brit. Col.), Ph.D. (Illinois), Honorary Lecturer.
W. S. PETERS, B.S.A. (Brit. Col.), Honorary Lecturer.
H. W. J. RAGETLI, Ir., Ph.D. (Wageningen), 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.
H. E. SCHREIER, B.A. (Colorado), M.Sc. (Sheffield), Ph.D. (Brit. Col.), Associate Professor.
A. A. BOMKE, M.S. (Southern Illinois), Ph.D. (Illinois), Assistant Professor.
M. D. NOVAK, B.Eng. (McGill), M.Sc. (Western Ontario), Ph.D. (Brit. Col.), Assistant Professor.
S. M. BERCH, B.Sc., M.Sc. (Waterloo), Ph.D. (Laval), N.S.E.R.C. University Research Fellow.
C. A. ROWLES, M.Sc. (Sask.), Ph.D. (Minn.), Honorary Professor.
J. D. BEATON, B.Sc.Agr., M.Sc. (Brit. Col.), Ph.D. (Utah State), Adjunct Professor.
C. H. CROSS, B.Sc.Agr., Ph.D. (Brit. Col.), Adjunct Professor.
A. J. GREEN, B.Sc.Agr. (Brit. Col.), M.Sc. (Iowa), Adjunct Professor.
V. G. K. MARSHALL, B.Sc., M.Sc., Ph.D. (McGill), Adjunct Professor.
D. E. MOON, B.Sc., Ph.D. (Brit. Col.), Adjunct Professor.
C. M. PRESTON, B.Sc. (McMaster), Ph.D. (Brit. Col.), Adjunct Professor.
L. VAN VLIET, B.Sc. (Netherlands), M.Sc. (Guelph), Adjunct Professor.

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	Food Science
(through the Faculty of	Plant Science
Applied 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 Associate 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 academic study with related and supervised work in co-operating employer organizations.

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 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 (summer only placement) or AGSC 199, 298, 397, 497, 498 (year-round schedule) as appropriate and are required to pay a Co-operative Education Program fee (see Index for Fees — Special Fees).

To graduate in the Co-operative Education Program students must complete three work terms for a summer only program and at least five work terms for a year-round program, in addition to the normal academic requirements. Students 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. The program emphasizes design, and covers the range of landscape contexts from the urban setting to regional and natural resource situations.

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 (W.C.V.M.) was established at the University of Saskatchewan to serve the four western provinces. A pre-veterinary program is required in preparation for admission to the four-year veterinary program at the W.C.V.M., and may be completed at UBC in the Faculty of Agricultural Sciences.

The course requirements for admission to W.C.V.M. are: 3 units each of English, Biology, Biochemistry, Chemistry, Physics and Mathematics; 1½ units each of Genetics, Organic Chemistry and Introductory Microbiology; and additional electives to complete 30 units.

Competition for admission to W.C.V.M. is severe, and although pre-veterinary requirements can be met in two years, few applicants are currently admitted with less than 3 years of university coursework. Pre-veterinary students are therefore strongly advised to follow a program that also satisfies the requirements of the B.Sc.(Agr.) program. For information and program approval contact the office of the Dean, Faculty of Agricultural Sciences.

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.

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

First Year:	Units	Second Year:	Units
AGSC 100	0	Agricultural Sciences Electives	
AGSC 110	1½	(Note 1)	1½
BIOL 101 or 102	3	AGSC 213	1½
CHEM 103, 110 or 120	3	ANSC 258	1½
ECON 100	3	CHEM 230	3
MATH 100, 120 or 140	1½	ENGL 100	3
MATH 101, 121 or 141	1½	MICB 200	3
PHYS 110, 115 or 120	3	BIOL 200 and 201	3
	16½		16½

Note 1: For detailed list of courses see Note 3 below under Requirements for the B.Sc. (Agr.) Degree.

Note 2: 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 registering. 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.

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.

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 ENGL 100 and must pass the English Composition Test (ECT). Students (including students transferring from other institutions) who have obtained credit for ENGL 100 but have not passed the Composition Test will write it at the first available sitting in September. The Test will also be given during the December examination period, in late March and in July.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

(1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.

(2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

Students who anticipate difficulty passing the Test are advised to enrol 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. In selecting courses for each year, the student is advised to consult a Faculty or Departmental Advisor. 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
AGSC 100	0
AGSC 110	1½
BIOL 101, 102 or 103	3
MATH 100, 120 or 140	1½
MATH 101, 121 or 141	1½
CHEM 103, 110 or 120	3
ENGL 100[1]	3
ECON 100[1]	3
Totals	16½
Second, Third and Fourth Years[2]	
Agricultural Sciences requirements and electives[3]	4½
AGSC 300[4]	1
AGSC 410	1½
Breadth Electives[5]	3
Unrestricted Electives[6]	4½ or 6
Major Program Seminar (423)	1
Major Program Undergraduate Essay (498) or Thesis (499)[7]	1½ or 3
Major Program requirements and electives[8]	31½ or 33
PLNT 321 or equivalent[9]	1½
Totals:	51½
Minimum units for graduation:	(68)

Notes:

1. Students enrolled in CHEM 110 or 120 require a suitable Physics course as a co-requisite and therefore may be given permission to defer ENGL 100 or ECON 100 until second year.
2. 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.
3. 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: AGEC 201, AGEC 258, BIOE 258, ANSC 258, FOOD 258, FOOD 259, PLNT 259, SOIL 200, SOIL 204.
4. Normally AGSC 300 (Field Trip) is taken prior to the beginning of Third Year.
5. Each student's total program must include a minimum 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.
6. 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.

7. 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.
8. 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.
9. A student must obtain approval of any course to be substituted for PLNT 321 from the head of the department in which he is specializing. Students specializing in Agricultural Economics may take ECON 325 and 326 instead of PLNT 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 from the University should refer to the General Information section of this calendar. (See Index under Withdrawal.)

TEACHER EDUCATION COURSE

As well as satisfying the requirements of their own departments in the Faculty, students planning to enter the Faculty of Education to qualify as Secondary Teachers of Agricultural Sciences, must have BIOL 101 or 102 or 103, CHEM 103 or 110 or 120, MATH 100 and 101, ECON 100, PHYS 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 (Secondary Teaching Field Requirements). GEOL 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 Animal Science or Plant 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: AGEC 258 (1½), ANSC 258 (1½), 421 (1½), BIOL 321 (1½), ECON 370 (1½), PHYS 110 or 115 or 120 (3), PLNT 259 (1½), 304 (1½), 320 (1½), 404 (1½), 405 (1½), SOIL 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. Agricultural economists examine 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. Two broad fields of study in the B.Sc. (Agr.) program are available: applied economics and management. Areas of specialization within these fields include: general agricultural economics, agribusiness, farm management, agricultural marketing, international trade and rural development, and resource management.

The general agricultural economics specialization is of interest to those thinking of a career in research or government. The agribusiness and farm management specializations are suggested for those whose interests lie in the business and farming sectors of the food system. The marketing, international trade and rural development specializations are concerned with the national and international marketplaces and problems faced by developing economies.

The resource management specialization emphasizes resource economics and allows for courses from other disciplines in land, water, range or other renewable or nonrenewable resource areas.

Requirements for the Bachelors degree are noted below. 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

AGSC 100	0
AGSC 110	1½
BIOL 101 or 102	3
CHEM 103 or 110 or 120	3
ECON 100	3
ENGL 100	3
MATH 100, 120 or 140	1½
MATH 101, 121 or 141	1½
	16½

Management/Applied Economics

Second Year

Agricultural Sciences Electives[1]	4½
AGEC 201	1½
AGEC 258	1½
AGEC 260[2]	1½
ECON 201 and 202[3]	3
Breadth Electives[4]	3
CPSC 114 (or 101)	1½
	16½

Third Year

AGSC 300	1
Agricultural Economics Core[5]	4½
ECON 325 and 326[6]	3
Management/Applied Economics Electives[7]	6
Unrestricted Electives	3
	17½

Fourth Year

AGSC 410	1½
AGEC 423	1
AGEC 498 or 499	1½ or 3
Agricultural Economics Core[5]	3 or 4½
Management/Applied Economics Electives[7]	4½
Unrestricted Electives	4½
	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: ANSC 258, BIOE 258, FOOD 258 or FOOD 259, PLNT 259, SOIL 200 or 214.
2. ECON 320 may be substituted with Department Head approval.
3. ECON 306 and 307 may be substituted with Department Head approval. ECON 200 is equivalent to ECON 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. Core courses include AGEC 302, 306, 340, 361, 374, 400, 407 and 420. Students selecting AGEC 499 must choose a minimum of 7½ units from this list, those taking AGEC 498 require 9 units.
6. STATS 305 and 306, PLNT 321 and 322, or COMM 290 and 291, 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 COMM 297/397, 393, 396, 457 or 458. Students in the applied economics option may choose any 300 or 400 level course in Agricultural Economics or Economics.
8. COMM 410, FRST 332 or MATH 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 BIOE 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.

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, dairy cattle, fish, sheep, swine and wild mammals. Field research areas are available also for studies of livestock and wildlife productivity.

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	
AGSC 100	0	Agricultural Sciences electives[1]	4½
AGSC 110	1½	AGSC 213	1½
BIOL 101 or 102	3	ANSC 258	1½
CHEM 103 or 110 or 120	3	CHEM 230	3
ECON 100	3	ENGL 100	3
MATH 100, 120 or 140	1½	Electives[2,6]	3
MATH 101, 121 or 141	1½		
PHYS 110 or 115 or 120	3		
	16½		16½

Third and Fourth Years

AGSC 300	1
AGSC 410	1½
ANSC 322	1½
ANSC 423	1
ANSC 498 or 499[7]	1½ or 3
PLNT 321 (or equivalent)	1½
Program requirements and electives (see below)	25½
	35

Requirements and electives for:

Livestock option		Poultry option	
ANSC 310 (or equivalent)	1½	ANSC 307	1½
ANSC 313[5]	1½	ANSC 310 (or equivalent)	1½
ANSC 320	3	ANSC 320	3
ANSC 321	1½	ANSC 321	1½
ANSC 440[5]	1½	ANSC 417	1½
ANSC 450[5]	1½	ANSC 435	1½
ANSC 460[5]	1½	ANSC 437	½
Electives[2,3,4,6]	15 or 13½	ANSC 439	1½
		Electives[2,3,4,6]	14½ or 13
	27 or 25½		27 or 25½

Fish option

ANSC 313	1½
ANSC 320	3
ANSC 480	1½
ANSC 481	1½
ANSC 482	1½
BIOL 302	1½
BIOE 306	1½
BIOE 485	1½
ZOOL 415	3
Electives[2,3,4,6,8]	(10½ or 9)
	27 or 25½

Rangeland Resources option

ANSC 320	3
ANSC 321	1½
ANSC 440	1½
BIOL 302	1½
ECON 370	1½
PLNT 304	1½
PLNT 401	1½
PLNT 404	1½
PLNT 405	1½
SOIL 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: AGEC 201 or 258; BIOE 258; FOOD 258 or 259; PLNT 259; SOIL 200 or 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 200, PLNT 259, and AGEC 258. For the Fish option, these electives must include AGEC 201 or 258 and FOOD 258 or 259.
2. The total program must contain at least 3 units of non-science electives.
3. The following electives are strongly recommended: (a) MICB 200 (b) a course in experimental design (c) a course in computer science.
4. The program allows 4½ units of unrestricted electives.
5. Substitutions for any or all of the courses ANSC 313, 440, 450, 460 will normally be approved for students wishing to elect a concentration in Wildlife Management. Substitutions should be selected from the following: ANSC 310, 321, 424, FRST 205 or BIOL 302, PLNT 304, FRST 395, 495. Consult the Departmental Advisor with respect to Electives.
6. Electives must be selected in consultation with a Faculty Adviser.
7. To be selected in consultation with the Head of the Department.
8. Recommended electives include BIOE 285 and CPSC 111 or 114.

Courses offered by other departments and faculties.

When choosing electives students should consider courses offered in the following subjects: Agricultural Economics, Biochemistry, Biology, Chemistry, Commerce, Computer Science, Economics, Food Science, Forestry, Geography, Mathematics, Microbiology and Pharmaceutical Sciences.

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	
AGSC 100	0	Agricultural Sciences	
AGSC 110	1½	Electives[1]	4½
BIOL 101 or 102	3	CHEM 230	3
CHEM 103 or 110 or 120	3	FOOD 259	1½
MATH 100, 120 or 140	1½	PHYS 110, 115 or 120	3
MATH 101, 121 or 141	1½	MICB 200	3
ENGL 100	3	Program Electives[2]	1½
ECON 100	3		
	16½		16½

Third and Fourth Year

AGSC 300	1
AGSC 410	1½
BIOE 300	1½
FOOD 301	1½
FOOD 302	1½
FOOD 303	1½
FOOD 308	1½
FOOD 309	1½
FOOD 404	1½
FOOD 423	1
FOOD 499	3
Food Science Electives[3]	3
MICB 307	1½
PLNT 321 or equivalent	1½
Nutrition Elective[4]	1½
Breadth Elective[5]	3
Program Electives[2]	3
Unrestricted Electives[6]	4½
	35

Notes:

1. The program must include 4½ units of courses chosen from the following list in consultation with a faculty adviser: AGEC 201 or 258; BIOE 258; ANSC 258; PLNT 259; SOIL 200 or 204.
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, 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 401, 410, 414 and (b) FOOD 402, 405, 416, 418.
4. The nutrition elective is to be selected from HUNU 203 or 305, or ANSC 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	
AGSC 100	0	AGSC 213[2,4]	1½
AGSC 110	1½	Agricultural Sciences Core	
BIOL 101 or 102	3	Requirements[2,4]	4½
CHEM 103 or 110 or 120	3	CHEM 230	3
ECON 100[1]	3	PHYS 110 or 115 or 120[1]	3
MATH 100, 120 or 140	1½	PLNT 258	1½
MATH 101, 121 or 141	1½	PLNT 259	1½
ENGL 100[1]	3	Unrestricted Electives[9]	1½
	16½		16½

Third and Fourth Years	
AGSC 300	1
AGSC 410[5]	1½
Breadth Elective[6]	3
PLNT 321 or equivalent	1½
PLNT 324 and 325	3
PLNT 331	1½
PLNT 336[7]	1½
PLNT 338	1½
PLNT 423[5]	1
PLNT 498 or 499[5]	1½ or 3
Major (option and program) requirements[8]	12 or 13½
Unrestricted Electives[9]	6 or 3
	35

Notes:

1. Students enrolling in CHEM 110 or 120 require a suitable Physics course as a co-requisite and therefore may be given permission to defer ENGL 100 or ECON 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 AGSC 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 200 in second year. The remaining 3 unit minimum should normally be selected from the following: AGEC 201 or 258, ANSC 258, BIOE 258, FOOD 258 or 259, SOIL 204. SOIL 204 is strongly recommended for students in all options. AGEC 258 and ANSC 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 PLNT 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 PLNT 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 PLNT 499 in any option require PLNT 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: AGEC 374 (1½); BIOE 360 (1½); PLNT 304 (1½), 326 (1½), 406 (1½), 408 (1½); SOIL 315 (1½), 416(1½).
Recommended electives: ANSC 322 (1½); PLNT 322 (1½), 405 (1½), 413 (1½); SOIL 333 (1½).

Rangeland Resources option:
Required: ANSC 421 (1½); BIOL 302 (1½); ECON 370 (1½); PLNT 304 (1½), 326(1½), 401 (1½), 404 (1½), 405 (1½), 408 (1½).
Recommended electives: AGEC 374 (1½); AGSC 213 (1½); ANSC 322 (1½); FRST 442 or GEOG 370 (1½); PLNT 336 (1½); SOIL 416 (1½).

Horticulture option:
Required: PLNT 314 (1½), 315 (1½) or 316 (1½), 411 (1½), 412 (1½), 417 (1½), 418 (1½), 433 (1½); SOIL 315 (1½).
Recommended electives: AGEC 416 (1½); PLNT 315 (1½) or 316 (1½), 322 (1½), 326 (1½), 400 (1½), 413 (1½), 414 (1½), 426 (1½).

Ornamental Horticulture option:
Required: LARC 220 (1½); PLNT 314 (1½), 315 (1½) or 316 (1½), 415 (1½), 418 (1½), 433 (1½); SOIL 315 (1½), and a minimum of 1½ units selected from FRST 292 (1½) and LARC 340 (1½).
Recommended electives: AGEC 416 (1½); PLNT 315 (1½) or 316 (1½), 322 (1½), 400 (1½), 413 (1½), 414 (1½), 426 (1½).

Crop Protection option:
Required: PLNT 431 (1½), 432 (1½) or 437 (1½) or 438 (1½), 433 (1½), 435 (1½) and a minimum of 4½ units selected from PLNT 406 (1½), 408 (1½), 411 (1½), 412 (1½), 417 (1½).
Recommended electives: BIOL 302 (1½), 303 (1½), 323 (1½); MICB 200 (3) or 417 (1½); PLNT 314 (1½), 322 (1½), 326 (1½), 413 (1½), 418 (1½); SOIL 315 (1½).

Entomology

Courses of study in entomology are offered through the Department of Plant Science, the Faculty of Forestry and the Biology Program. 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. The Biology Program offers introductory and advanced courses in general entomology and the Department of Zoology 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 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.

Courses suitably complementary to programs of study in Plant Science are offered by other faculties and departments in the following subjects: Agricultural Economics, Biochemistry, Biology, Commerce, Computer Science, English, Food Science, Forestry, Geography, Geology, and Soil Science. Students are reminded that all programs of study must be approved by the Head of the Department.

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, and remote sensing techniques. 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 Ministry of Environment; Soils and Engineering Branch, Ministry of Agriculture and Fisheries; and B.C. Land Resource Unit, 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	
AGSC 100	0	Agricultural Sciences Electives[2]	1½
AGSC 110	1½	CHEM 230, 205 or 208	3
BIOL 101 or 102	3	ENGL 100	3
MATH 100, 120 or 140	1½	MICB[3]	3
MATH 101, 121 or 141	1½	SOIL 200	1½
CHEM 103, 110 or 120	3	SOIL 204	1½
ECON 100	3	GEOL 105[3]	3
PHYS 110 (115 or 120)	3		16½
	16½		
Third Year (Note 4)		**Fourth Year**	
AGSC 300	1	AGSC 410	1½
Breadth Electives[5]	3	SOIL 423	1
PLNT 321 or equivalent	1½	SOIL 498 or 499	1½ or 3
Agricultural Sciences Electives[2]	3	Soil Science and General Electives[6]	12 or 13½
CHEM 230, 205 or 208	3		
Soil Science and General Electives[6]	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. 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: ANSC 258; AGEC 201 or 258; BIOE 258; FOOD 258 or 259; PLNT 259.

3. Permission may be granted by the Head of the Department of Soil Science to substitute GEOL 150 (2) for GEOL 105 (3) and/or MICB 417 (1½) for MICB 200 (3).
4. 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.
5. 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.
6. Electives should be chosen in consultation with the Department Head. A minimum of 9 units of Soil Science courses are required exclusive of SOIL 200, 204, 423 and either 498 or 499. These 9 units are to be selected as follows: 6 units from SOIL 303 or 315 and 404, 413 and 416 and 3 units from SOIL 311, 321, 333, 414, 417, 418, 419, 422, 430, 442, and 443. Students are recommended to take a course in remote sensing, e.g., SOIL 442 or 443 and in computer science. The program allows 4½ or 6 units of unrestricted electives depending on choice of SOIL 498 (1½) or SOIL 499 (3).

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, Chemistry, Computer Science, Economics, Geography, Geological Sciences, Geophysics, Mathematics, Microbiology, and Physics.

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 Building.

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 LARC 101, 102 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 69 units of work. The program consists of a core of required courses and extensive lists of elective 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.

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.

First Year		Second Year	
LARC 101[4]	2½	LARC 201	2½
LARC 102	2½	LARC 202	2½
LARC 150	1½	LARC 220	1½
LARC 199	1	LARC 250	1½
ENGL 100	3	ECON 100	3
FRST 292	1½	FRST 205	1½
GEOG 101	3	GEOG 220	1½
PLNT 110 (or 259)	1½	PLNT 316	1½
SOIL 300 (or 200)	1½	Recommended electives[1,2]	1½
	18		17

Third Year		Fourth Year	
LARC 301	2½	LARC 410	2½
LARC 302	2½	LARC 499	3
LARC 340	1½	LARC 440	1½
LARC 350	1½	LARC 450	1
ARCH 472	1½	Recommended electives[1,2]	6
GEOG 350	1½	Arts elective[3]	3
Recommended electives[1,2]	6		17
	17		

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.
4. Students, with permission of the Director of Landscape Architecture Program and the Head of the Department of Plant Science, may enroll in the first year studio course, LARC 103 (5) during the summer session instead of LARC 101 and 102. For additional information consult the Program Director.

B.Sc. PROGRAM IN NUTRITIONAL SCIENCES

This program is offered by the School of Family and Nutritional Sciences, the Faculty of Agricultural Sciences and the Faculty of Science.

The program in Nutritional Sciences is specifically intended for those students interested in basic nutritional sciences, who desire preparation for graduate study and research in Nutrition, and for students who plan to proceed to an area of Agricultural or Health Sciences in which a background in nutrition would be of value. All students take required courses in both animal (comparative) and human nutrition, but each student may select additional courses to emphasize one area or the other.

Before registering for each of the Second, Third and Fourth years of this program, every student must obtain formal program approval from an advisor in either the School of Family and Nutritional Sciences or the Faculty of Agricultural Sciences.

First Year		Second Year	
BIOL 101 or 102	3	BIOL 200 and 201	3
CHEM 110 or 120	3	CHEM 230 (or 203)	3
ENGL 100	3	MICB 200	3
MATH 100 or 120	1½	Arts Elective[1]	3
MATH 101 or 121	1½	Science Elective[1]	3
PHYS 110, 115, or 120	3		15
	15		

Third Year		Fourth Year	
ANSC 321 or FOOD 301[2]	1½	ANSC 323 or HUNU 309[2]	1½
BIOC 301 and 302	3	ANSC 425	1½
BIOL 300	1½	BIOL 334 and 335	3
HUNU 305 and 307	3	Arts Elective	3
BIOL 353	3	Science Elective	1½
Electives[1]	3	Electives[1]	4½
	15		15

Notes:

1. Electives must be chosen in consultation with adviser. Students are cautioned to take due regard to prerequisites.
2. Students must take either Sequence A: ANSC 321 and 323; or Sequence B: FOOD 301 and HUNU 309.

Recommended Science Electives:

BIOC 402 (1½), 403 (1½); BIOL 310 (1½), 333 (1½), 350 (1½), 354 (1½), 450 (1½), 453 (1½), 454 (1½), 456 (1½); CHEM 205 (3), 311 (2), 313 (3), 335 (3), 421 (1); CPSC 111 (1½), 114 (1½), 116 (1½), 118 (1½); MATH 200 (1½), 221 (1½); MEDG 410 (1½), 420 (1½); MICB 302 (1½), 307 (1½), 308 (1½); PCTH 305 (3); PHYL 422 (1½), 423 (1½), 424 (1½), 426 (1½); STAT 205 (1½).

Nutritional Science Electives:

HUNU 303 (1½), 403 (1½), 407 (3), 409 (1½), 411 (1½), 419 (1½), 467 (1½/3); ANSC 412 (1½), 420 (1½); FOOD 302 (1½), 402 (1½), 418 (1½).

(Note: with the exception of HUNU 409, none of the Nutritional Sciences electives may be used to satisfy the Faculty of Science requirement of 21 units of Arts and Science courses, including 15 units of Science, numbered 300 and above.)

Agriculture Canada

Research Branch

Vancouver Research Station

Dean L. Stroble, B.A., M.A., Ph.D. (Sask.), F.E.S.C., Director

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 visits by scientists from the Polish agricultural universities to the Faculty.

THE FACULTY OF APPLIED SCIENCE

ACADEMIC STAFF

Office of the Dean

A. MEISEN, B.Sc., A.C.G.C. (Imp. College London) M.Sc. (Calif. Inst. Tech.), Ph.D. (McGill), F.C.I.C., P.Eng., Professor of Chemical Engineering and Dean of the Faculty.

M. S. DAVIES, M.A. (Cantab.), M.S., Ph.D. (Illinois), Mem. I.E.E.E., P.Eng., Associate Professor of Electrical Engineering, Associate Dean.

S. MINDESS, B.A., B.Sc. (C.E.) (Man.), M.S., Ph.D. (Stanford), P.Eng., Professor of Civil Engineering and Engineering Core Program Director.

Co-operative Education Programs

J. E. LAND, B.Sc. (Agr.) (Guelph), M.B.A. (Simon Fraser), Acting Director.

Department of Bio-Resource Engineering

V. K. LO, B.Sc. (Taiwan), M.Sc. (Hawaii), Ph.D. (Massachusetts), P.Eng., Professor and Head of the Department.

J. W. ZAHRADNIK, B.S. (Penn. State), M.S. (Iowa State), Ph.D. (M.I.T.), Professor.

S. T. CHIENG, B.Sc. (Taiwan), M.Sc. (McGill), Ph.D. (McGill), P.Eng., Associate Professor.

A. K. P. LAU, B.Sc., M.Sc. (Guelph), Ph.D. (Brit. Col.), Assistant Professor.

R. J. PETRELL, B.A. (Minn.), M.Sc. (Penn. State), Ph.D. (Florida), Assistant Professor.

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D. TROMANS, B.Sc., Ph.D. (Leeds), Professor.
F. WEINBERG, B.A.Sc., M.A., Ph.D. (Toronto), P.Eng., F.T.M.S., Professor.
N. R. RISEBROUGH, B.A.Sc., M.S.Sc. (Toronto), Ph.D. (Brit. Col.), Associate Professor.
I. V. SAMARASEKERA, B.Sc. (Sri Lanka), M.Sc. (California), Ph.D. (Brit. Col.), P.Eng., Associate Professor.
P. V. BARR, B.Sc., M.Sc. (New Brunswick), Ph.D. (Brit. Col.), P.Eng., Assistant Professor.
R. G. BUTTERS, B.A.Sc., M.A.Sc. (Brit. Col.), Assistant Professor.
D. B. DREISINGER, B.Sc., Ph.D. (Queen's), P.Eng., Assistant Professor.
A. POURSARTIP, B.A., M.A., Ph.D. (Cantab.), Assistant Professor.
G. G. RICHARDS, B.A.Sc., Ph.D. (Brit. Col.), P.Eng., Assistant Professor.
C. SCHVEZOV, Licen. Fisica (Argentina), M.A.Sc., Ph.D. (Brit. Col.), Assistant Professor.
W. C. COOPER, B.A.Sc., M.A.Sc. (Brit. Col.), Ph.D. (Princeton), F.C.I.C., F.C.I.M. Adjunct Professor.
T. DEGAWA, Visiting Research Associate.
S. RUHONG, Visiting Scientist.
S. E. CHIDIAC, Research Associate.
W. LIU, Research Associate.
R. VAZIRI, Research Associate.

Department of Mining and Mineral Process Engineering

A. L. MULAR, B.Sc., M.Sc. (Mont. Sch. of Mines), P.Eng., M.C.I.M., A.I.M.E. Professor and 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., A.I.M.E., M. Amer. Chem. Soc., Am. Fine Particle Society, Professor.
G. W. POLING, M.Sc., Ph.D. (Alta.), P.Eng., M.C.I.M., F.I.M.M., M.A.I.M.E., Professor.
A. E. HALL, B.Eng. (Sheffield), Ph.D. (Nottingham), M.C.I.M., F.M.V.S., M.S.A.I.M.M., Associate Professor.
JOHN A. MEECH, B.Eng. (McGill), M.Sc. (Eng.), Ph.D. (Queen's), P.Eng., M.C.I.M., Associate Professor.
R. PAKALNIS, M.A.Sc., Ph.D. (Brit. Col.), Assistant Professor. P.Eng.

Lecturers from other Departments

C. I. GODWIN, B.A.Sc., Ph.D. (Brit. Col.), P.Eng., Associate Professor, Department of Geological Sciences.

Adjunct Professors

G. E. AGAR, B.A.Sc. (Brit. Col.), Sc.D. (M.I.T.).
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.)
B. C. FLINTOFF, B.Sc. (Simon Fraser), M.Sc. (Alberta), Ph.D. (Alberta).
D. LAQUITTON, Ph.D. (Supérieur de Chimie), D.Sc. (Laval).
K. E. MATTHEWS, B.Eng., M.Eng. (Queensland), P.Eng., C.I.M.M., A.I.M.M.
J. E. UDD, B.Eng., M.Eng., Ph.D. (McGill), P.Eng., C.I.M.M., A.S.T.M.
A. D. WALTERS, M.Eng., (Penn. State).

Sessional Lecturer

K. CARRIERE, B.A.Sc. (McGill), M.A.Sc. (Brit. Col.).

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. In addition, the Faculty contains the Centre for Metallurgical Process Engineering.

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. Metals and Materials 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. Students may also enter the Engineering program after spending one or more years in the Faculty of Science, 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 (see below). Depending on the transfer credit in Engineering received from first year Science (see below under "Admission from Science"), such students may be able to complete an engineering degree with three further years of study, otherwise they will require four further years.

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 admission to these programs are set out 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 standing in Grades 11 and 12 courses in Algebra, Chemistry, Physics and English. Applicants from schools where either Physics 12 or Chemistry 12 is not available may petition to be excused this deficiency. NOTE: The University is prepared to offer early admission to Secondary School students graduating in June 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 Chemistry, Physics and Mathematics (60% average in Mathematics 100 and 101, minimum 60% in Mathematics 101). Applicants from a college or another university are eligible for consideration if they have achieved an overall grade-point 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 registered in Science who have taken 30 or more units must normally have an average of at least 60 per cent on all courses taken in their most recent 30 units of study in Science, including any failed units.

Applicants from first year at an approved university or college should normally have taken the following prerequisite subjects (applicants who are deficient in one or more of these subjects should consult the Office of the Dean of Applied Science):

	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

Applicants with more than 12 units of transfer credit in Engineering may be eligible for second year Engineering, depending on the program which they wish to enter and the transfer credit received. Advice on transfer credit is available from the Applied Science Dean's Office. Applicants admitted to second year may be able to complete their Engineering program in three years following first year Science, depending on the first year Engineering courses that they lack and the arrangements that they can make for completing these courses. These applicants must obtain a "Second Year Program Preference Form" from the Applied Science Dean's Office and return the completed form to the Dean's Office **by June 30th**.

Exemptions are given for courses in first year Applied Science for the following courses normally taken in first year Science at UBC:

CHEM 110 or 120	— CHEM 151
MATH 100 or 120	— MATH 153
MATH 101 or 121	— MATH 154
PHYS 110, 115 or 120	— PHYS 153

The following courses, which can be taken as electives in first year Science, also give the exemptions indicated:

CPSC 114, 116 **(prior to 1990/91)** CPSC 124, 126 **(effective 1990/91)**, or CPSC 111	— CPSC 151
CPSC 116 **(prior to 1990/91)** CPSC 126 **(effective 1990/91)**	— CPSC 118
MATH 221	— MATH 152
GEOL 105	— GEOL 150

MATH 221 is required for students wishing to enter Electrical Engineering or Mechanical Engineering. GEOL 105 is recommended for students wishing to enter Civil, Geological or Mining & Mineral Process Engineering.

APSC 151 will normally be offered during the summer session, and possibly PHYS 170.

Applicants with 12 or fewer units of transfer credit in Engineering will normally enter first year Engineering and take a program similar to the "Typical Transfer Program Following First Year Science" shown below. They will normally require four years following first year Science to complete their Engineering programs.

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. Students who have been required to withdraw from an engineering program at another university will not normally be admitted.

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 at the first available sitting in September. This Test will also be given during the December examination period, in late March 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.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which *must* be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

(1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.
(2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

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 (five Winter Sessions for Engineering Physics). With the approval of the Office of the Dean a student may be allowed to study on a part-time basis. Credit will 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.

Complementary Studies Courses

Students must take Complementary Studies courses totalling at least 10½ units. The **minimum** requirements are as follows (except for Chemical Engineering, which requires an additional 1½ units of humanities or communications courses):

English 100	3 units
Engineering Economics (see note 1 below)	1½ units
Approved electives including:	6 units

(a) a minimum of 1½ units dealing with the impact of technology on society (see note 2 below);
(b) a minimum of 3 units of humanities courses at the 200 level or above (see note 3 below);
(c) additional humanities courses to make up the required total of 6 units (see notes 3 and 4 below).

All Complementary Studies courses are subject to the approval of the Faculty of Applied Science.

Note: (1) All engineering programs include a 1½ unit engineering economics course, usually taken in third or fourth year. Approved courses include CHML 359, CIVL 300, ELEC 450, MECH 391, MMAT 466 and MMPE 396.

(2) Courses which satisfy requirement (a) include: APSC 261 (1½), APSC 262 (1½), GEOG 310 (1½), HIST 215 (3), HIST 425 (3), PHIL 313 (1½), PHIL 314 (1½), PHIL 407 (1½), POLI 361 (3), SOCI 210 (3), SOCI 260 (1½/3), URST 200 (3). Students may propose other courses in this subject area to the Dean's Office.

(3) Humanities courses must deal with some of the central issues, methodologies and thought processes of the humanities and social sciences. Students may obtain advice from the Dean's Office concerning acceptable courses. Generally speaking, basic language courses, scientific geography courses, statistical courses, studio/performance courses in fine arts and music, will not satisfy this requirement. Courses from the group which satisfy the "technology and society" requirement (listed in note 2 above), **except for APSC 261 and 262**, can also be counted towards requirement (b).

(4) Courses dealing with oral or written communications may replace up to 1½ units of courses required in (c) above (note: some departments require a communications course) but will not count towards requirement (b).

NOTE: Students already registered in an engineering program in 1987/88 or earlier will have the option of completing either the new Complementary Studies requirement or the former Humanities Elective requirement as stated in the 1987/88 Calendar (p. 51). Students who enter an engineering program after September 1988 will be required to meet the Complementary Studies requirement.

Student Classification

Regular students are classified as "full time" or "part time" as follows:

In order to be classified as "full time", a student must carry a unit load in the Winter Session which is equal to at least 80% of the standard unit load for the year and program in which the student is registered. 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. 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.

Applications for special consideration for examinations missed on account of illness or domestic affliction must be submitted to the Dean before or immediately after the missed examination(s). For information regarding medical certificates see the General Information section of the Calendar.

Advancement

The minimum passing mark in each course is 50%. 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%. For students who are taking a full program of study (see above under full-time status), year standing is given on the same basis except that Pass is 55% to 64% (see next paragraph).

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 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 will be required to withdraw.

In a failed year a student will be granted credit for all courses passed.

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.

Term essays and examination papers may be refused a passing mark if they are noticeably deficient in English.

Supplemental Examinations

A student in a Winter Session who is not classified as "Fail" but who has failures in some courses, may write a supplemental examination in each failed course in which a supplemental examination is available, and in which a final grade of not less than 40 per cent has been 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."

Field Trips

Students who are 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 (except for the Computer-Aided Automation option and the Industrial Aerodynamics and Aircraft option in Mechanical Engineering) and is intended to provide interested and qualified students in all branches of engineering with work experience relevant to their future careers. Faculty advisers or coordinators visit students at their places of work and provide advice on the technical reports that are a requirement of the Program.

The co-op program in Applied Science is available in two patterns:

— a summer-only program entailing three consecutive summer work terms, available in all programs except as noted below;

— a year-round program entailing one spring and one fall work term as well as summer placements, and so requiring an additional year to complete the B.A.Sc. requirements. This pattern is available in:

Electrical Engineering
Mechanical Engineering
} — five work terms are required

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 (see Applied Science courses in the "Courses of Instruction" section of the Calendar) and will be required to pay a 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, Room 213, 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 is offered 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 439 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, Metals and Materials, Mining and Mineral Process Engineering and in Engineering Physics are accredited by the Canadian Engineering Accreditation Board (C.E.A.B.) of the Canadian Council of Professional Engineers. Graduates of C.E.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

FIRST YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 120 (0) Intro. to Engineering	1	—	—	—	—	—
APSC 151 (1½) Computer-Aided Engineering Graphics	1	—	4	—	—	—
CHEM 151 (3) Engineering Chemistry	3	3*	—	3	—	1
CPSC 151 (1½) Introduction to FORTRAN Programming	3	—	1	—	—	—
ENGL 100 (3) Literature & Composition	3	—	—	3	—	—
MATH 152 (1½) Linear Algebra & Diff. Eq.	—	—	—	3	—	—
MATH 153 (1½) Differential Calculus	3	—	1	—	—	—
MATH 154 (1½) Integral Calculus	—	—	—	3	—	1
PHYS 153 (3) Elements of Physics	3	—	1	3	3	1
PHYS 170 (1½) Mechanics I	—	—	—	3	—	1
TOTALS: 18 units Hours:	17	1½	7	18	3	4

* Alternate weeks.

TYPICAL TRANSFER PROGRAM FOLLOWING FIRST YEAR SCIENCE#

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 120 (0) Introduction to Engineering	1	—	—	—	—	—
APSC 151 (1½) Computer-Aided Engineering Graphics	—	—	—	1	—	4
CPSC 151 (1½) Introduction to FORTRAN Programming	—	—	—	3	—	1
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 170 (1½) Mechanics I	3	—	1	—	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	1	—
†Complementary Studies Electives (3)	3	—	—	3	—	—
TOTALS: 15 units Hours:	13	—	—	16	1	5

Applicants with more than 12 units of Engineering transfer credit may be eligible for second year Engineering (see "Admission from Science" above).

† Please refer to the statement headed "Complementary Studies Courses" above.

* Alternate weeks.

SECOND, THIRD AND FOURTH YEARS

The curriculum tables which follow show the requirements for each program year as they are **in the current session**. However, because of possible curriculum revisions, these requirements will not necessarily be the same in future sessions. Students should therefore be aware that the requirements which they will have to satisfy in subsequent years may not be the same as those which appear in the current Calendar.

Options in Third and Fourth Years

In some departments selected groups of courses are offered as options which represent different areas of interest. 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. Students entering Third Year should consult representatives of the departments concerned before registering for the courses offered.

1. Bio-Resource Engineering

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
BIOE 250 (1½) Biosystems for Engineers	2	—	2	—	—	—
BIOE 255 (1½) Physical Properties of Plant and Animal Materials	—	—	—	2	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 235 (2) Plane Surveying	At end of 2nd Term, 1st Year					
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—

1. Bio-Resource Engineering—Continued

MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
MATH 257 (1½) Partial Differential Equations	—	—	—	3	—	—
PHYS 270 (1½) Mechanics II	3	—	1	—	—	—
STAT 251 (1½) Elem. Statistics	—	—	—	3	1	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 21½ units Hours:	20	—	7	16	2	3

* Alternate weeks.
† Please refer to the statement Headed "Complementary Studies Courses" above.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 380 (1½) Introduction to Microcomputers	—	—	—	2	3*	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
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
BIOE 390 (1½) Biomass Conversion and Utilization	2	2*	2*	—	—	—
CHML 359 (1½) Chemical Engineering Economics	—	—	—	3	—	—
ELEC 263 (1½) Basic Circuit Analysis	2	2*	1	—	—	—
ELEC 370 (1½) Electrical Machines and Power Transmission	—	—	—	2	2*	1
MICB 417 (1½) Introduction to Applied Microbiology	3	—	2	—	—	—
SOIL 413 (1½) Physical Behaviour of Soils	3	2	—	—	—	—
Plus 3 units technical electives selected in consultation with the department before the end of second year.						
TOTALS: 21 units Hours:††	15	4	6	13	3½	7

* Alternate weeks.
†† Core courses only; electives not included.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
BIOE 471 (1½) Systems Design I	2	2*	2*	—	—	—
BIOE 489 (1) Seminar	—	—	2*	—	—	2*
BIOE 499 (3) Thesis	—	2	—	—	4	—
Plus 12 units technical electives selected in consultation with the department before the end of third year, with a minimum of 4½ units taken from department offerings.						
†Complementary Studies Electives (3)	3	—	—	3	—	—
TOTALS: 21 units Hours:††	6	3	2	3	4	1

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.
†† Core courses only; electives not included.

2. Chemical Engineering

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	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	—	—
PHYS 270 (1½) Mechanics II	—	—	—	3	—	1
†Complementary Studies Elective (1½)	3	—	—	—	—	—
TOTALS: 21½ units Hours:	20	5	1½	20	6	3½

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CHEM 352 (1½) 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 (1) 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) Basic Circuit Analysis	2	2*	1	—	—	—
STAT 251 (1½) Elementary Statistics	3	1	—	—	—	—
Technical Elective (1)	—	—	—	2	—	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 21½ units Hours:	17	5	4	20	5	2

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
CHML 442 (1½) Diffusional Operations II	3	—	2*	—	—	—
CHML 454 (3) Process Design Project	—	—	2	—	—	2
CHML 455 (3) Chem. Eng. Reactor Design	2	—	—	2	4	—
CHML 457 (1) Process Synthesis	2	—	2*	—	—	—
CHML 464 (1½) Chemical Engineering Laboratory IV	—	6	—	—	—	—
CHML 491 (½) Thesis Proposal	—	2	—	—	—	—
CHML 492 (2½) Thesis	—	—	—	—	8	—
CHML 498 (1) Summer Essay	Summer Task					
ELEC 370 (1½) Electrical Machines & Power Transmission	—	—	—	2	2*	1
Technical Elective (2)	2	—	—	2	—	—
†Complementary Studies Electives (3)	3	—	—	3	—	—
TOTALS: 21 units Hours:	13	8	4	9	13	3

† Please refer to the statement headed "Complementary Studies Courses" above.
* Alternate weeks.

Chemical Engineering - Chemistry Honours

The Chemical Engineering - Chemistry Honours program is jointly administered by the Departments of Chemical Engineering and Chemistry. Enquiries regarding the program and student advising should be made to the faculty advisers in either Department.

The completion of the B.A.Sc. degree in Chemical Engineering - Chemistry Honours will normally take five years of university study. Entry to the program is normally from First Year Applied Science. To obtain permission to enter the

program students must consult faculty advisers in the Departments of Chemical Engineering and Chemistry.

The five-year Chemical Engineering - Chemistry Honours program has an integrated sequence of Chemistry courses which are different from those in the regular four-year Chemical Engineering program. Because of this and other differences between the programs, transfer from one to the other becomes progressively more difficult after first year. Students who complete four years of the combined program (including fourth-year Chemical Engineering) would have a number of deficiencies to make up if they wished to graduate at that point with a B.A.Sc. in Chemical Engineering.

Students who satisfactorily complete the program and who obtain a minimum overall second-class average in their chemistry courses numbered 300 and higher, will receive a B.A.Sc. in Chemical Engineering - Chemistry Honours.

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CHEM 201 (1½) Physical and Analytical Chemistry	2	4	1	—	—	—
CHEM 202 (1½) Inorganic and Analytical Chemistry	—	—	—	2	4	1
CHEM 203 (3) Organic Chemistry	3	3	—	3	3	—
CHML 241 (1½) Mass and Energy Balances	3	—	1	—	—	—
CHML 242 (1) Chem. Proc. Technology	—	—	—	2	—	1
CHML 251 (1½) Transport Phenomena I	—	—	—	3	—	2*
CHML 261 (½) Chem. Eng. Lab I	—	—	—	—	4*	—
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	—	—
ELEC 263 (1½) Basic Circuit Analysis	2	2*	1	—	—	—
†Complementary Studies Elective (1½)	3	—	—			
TOTALS: 19½ units Hours:	19	8	3	16	9	3

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CHEM 304 (3) Physical Chemistry	2	4*	2*	2	4*	2*
CHEM 311 (2) Analytical Chemistry	2	4*	—	1	4*	—
CHEM 312 (2) Quantum Chem. and Spectroscopy	2	—	1	2	—	1
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 (1) Mechanical and Thermal Operations	2	—	2*	—	—	—
CHML 356 (1½) Process Control	—	—	—	3	—	—
CHML 358 (1) Properties of Fluids	—	—	—	2	—	—
CHML 359 (1½) Chemical Engineering Economics	—	—	—	3	—	—
CHML 362 (1) Chemical Eng. Lab. II	—	3	—	—	—	—
CHML 363 (1) Chemical Eng. Lab. III	—	—	—	—	3	—
†Complementary Studies Elective (1½)	3	—	—	—	—	—
TOTALS: 20½ units Hours:	16	7	5	18	7	4

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.

FOURTH YEAR‡

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
CHML 357 (1) Interfacial Phenomena	—	—	—	2	—	—
CHML 442 (1½) Diffusional Operations II	3	—	2*	—	—	—
CHML 454 (3) Process Design Project	—	—	2	—	—	2
CHML 455 (3) Chem. Eng. Reactor Design	2	—	—	2	4	—
CHML 457 (1) Process Synthesis	2	—	2*	—	—	—
CHML 464 (1½) Chemical Engineering Lab IV	—	6	—	—	—	—
**CHML 491 (½) Thesis Proposal	—	2	—	—	—	—
**CHML 492 (2½) Thesis	—	—	—	—	8	—
CHML 498 (1) Summer Essay	Summer Task					
ELEC 370 (1½) Electrical Machines & Power Transmission	—	—	—	2	2*	1
STAT 251 (1½) Elementary Statistics	3	—	1	—	—	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 21½ units Hours:	14	8	5	9	13	3

‡ Fourth and Fifth year may be taken in either order.
* Alternate weeks.
** In the total program, students must take at least one of CHML 491 and 492, or CHEM 449. If CHML 491 and 492 are not taken they must be replaced by 3 units of CHML technical electives.
† Please refer to the statement headed "Complementary Studies Courses" above.

FIFTH YEAR‡

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CHEM 310 (3) Inorganic Chemistry	2	4*	1	2	4*	1*
CHEM 330 (3) Adv. Organic Chem.	3	4	—	3	4	—
CHEM 415 (2) Practical Chem. Lab.	—	8	—	—	8	—
**CHEM 449 (3) Seminar and Thesis	1	6	—	1	6	—
CHEM Electives (3)	3	—	—	3	—	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 17 units Hours:	12	20	1	12	20	1

‡ Fourth and Fifth year may be taken in either order.
* Alternate weeks.
** In the total program students must take at least one of CHEM 449, or CHML 491 and 492. If CHEM 449 is not taken it must be replaced by 3 units of 400-level CHEM electives.
† Please refer to the statement headed "Complementary Studies Courses" above.

3. Civil Engineering

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	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	—	—	—	3	—	1
CIVL 235 (2) Plane Surveying	(At end of 2nd Term, 1st Year)					
GEOL 150 (1½) Earth Sciences for Engineers	3	2	—	—	—	—
MATH 253 (1½) Multivariable Calculus	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	3	—	—	—	—	—
PHYS 270 (1½) Mechanics II	3	—	1	—	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	1	—
†Complementary Studies Electives (1½)	3	—	—	—	—	—
TOTALS: 23 units Hours:	21	2	5	19	5	4

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CIVL 300 (1½) Engineering Economic Analysis	3	—	—	—	—	—
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*	—

3. Civil Engineering—Continued

CIVL 315 (1½) Closed Conduit Hydraulics	2	2*	1	—	—	—
CIVL 316 (1½) Open Channel Hydraulics	—	—	—	2	2*	1
CIVL 320 (1½) Civil Engineering Materials II	3	2*	—	—	—	—
CIVL 321 (1) Laboratory Project in Engineering Materials	—	—	—	1	2	—
CIVL 330 (1½) Structural Design I	3	—	2*	—	—	—
CIVL 331 (1½) Structural Design II	—	—	—	3	—	2*
CIVL 332 (1½) Structural Analysis I	3	—	—	—	—	—
CIVL 340 (1½) Transportation Engineering I	—	—	—	3	—	—
MATH 257 (1½) Partial Differential Equations	3	—	—	—	—	—
†Complementary Studies Elective (1½)	—	—	—	3	—	—
TOTALS: 20½ units Hours:	20	3	2	18	4	2

* Alternate Weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
CIVL 400 (1½) Construction Engineering Management	—	—	—	3	—	—
CIVL 402 (1) Engineering Law and Contracts in Civil Engineering	—	—	—	2	—	—
CIVL 405 (1½) Environmental Impact Studies	3	—	—	—	—	—
CIVL 410 (1½) Foundation Engineering I	3	—	—	—	—	—
CIVL 415 (1½) Water Resources Engineering	—	—	—	3	—	—
CIVL 430 (1½) Structural Design III	3	—	—	—	—	—
CIVL 431 (1½) Structural Analysis II	3	—	—	—	—	—
CIVL 439 (1½) Engineering Surveying	3	3*	—	—	—	—
CIVL 445 (1½) Experimental Design and Analysis	—	—	—	—	6	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
‡Plus 4½ units technical electives from Civil Engineering	3	—	—	6	—	—
TOTALS: 21 units Hours:	22	1½	—	17	6	—

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.
‡ Technical Electives are to be chosen in consultation with departmental advisers and approved by the Head of the Department.

4. Electrical Engineering

In addition to the regular Electrical Engineering program, there are two options, Honours Mathematics and Computer Engineering, as described below.

Engineering Economics Requirement

ELEC 450 (1½) Economic Analysis of Engineering Projects, was introduced as a core course in 1988/89 as part of the new complementary studies requirement (which replaced the former applied humanities requirement). Students already in the Faculty prior to 1988/89 have the option of completing **either** the former applied humanities requirement **or** the new complementary studies requirement. For those who elect to satisfy the former applied humanities requirement, ELEC 450 is not a core course but, if taken, can be counted as either a technical or a free elective. For those who elect to satisfy the new complementary studies requirement, ELEC 450 **is** a core course and must be taken in fourth year.

Regular Electrical Engineering Program

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CPSC 118 (1½) Principles of Computer Programming	3	3	1	—	—	—
ELEC 251 (1½) Circuit Analysis I	2	—	2	—	—	—
ELEC 253 (1½) Circuit Analysis II	—	—	—	2	—	2
ELEC 254 (1½) Electronic Circuits I	—	—	—	3	—	1
ELEC 256 (1½) Digital Logic Design	2	—	2	—	—	—
ELEC 259 (1½) Introduction to Microcomputers	—	—	—	2	—	2
ELEC 261 (1½) Engineering Electromagnetics	—	—	—	3	—	1
ELEC 280 (1) Electrical Laboratory I	—	3	—	—	—	—
ELEC 281 (1) Electrical Laboratory II	—	—	—	—	3	—
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	—	—
†Complementary Studies Electives (3)	3	—	—	3	—	—
TOTALS: 21½ units Hours:	16	6	5	19	3	6

† Please refer to the statement headed "Complementary Studies Courses" above.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CPSC 210 (1½) Computer Program Design I	—	—	—	3	—	1
ELEC 351 (1½) Physical Microelectronics	2	—	2	—	—	—
ELEC 356 (1½) Electronic Circuits II	2	—	2	—	—	—
ELEC 359 (1½) Signals and Communications	3	—	1	—	—	—
ELEC 360 (1½) Systems and Control	—	—	—	3	—	1
ELEC 364 (2) Electromagnetic Fields and Waves	—	—	—	3	—	2
ELEC 367 (1½) Measurements and Instrumentation	—	—	—	2	3*	—
ELEC 371 (1½) Power Circuits and Devices	2	—	2	—	—	—
ELEC 372 (1½) Rotating Machines	—	—	—	2	—	2
ELEC 380 (2) Electrical Laboratory III	—	6	—	—	—	—
ELEC 381 (2) Electrical Laboratory IV	—	—	—	—	6	—
ENGL 301 (1½) Practical Writing	—	—	—	3	—	—
MATH 350 (1½) Complex Variables and Applications	3	—	—	—	—	—
STAT 251 (1½) Elementary Statistics	3	—	—	—	—	—
TOTALS: 22½ units Hours:	15	6	7	16	7½	6

* Alternate weeks.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
ELEC 450 (1½) Economic Analysis of Engineering Projects	3	—	—	—	—	—
ELEC 452[1] (1½) Electrical Engineering Materials	2	2*	2*	—	—	—
ELEC 474 (2) Systems Laboratory I	—	6	—	—	—	—
ELEC 475 (2) Systems Laboratory II	—	—	—	—	6	—
ELEC 498 (1) Engineering Report	—	—	—	—	—	—
Complementary Studies Elective (1½)	—	—	—	3	—	—
Electives[2] (13½)	8	—	8	10	—	10
TOTALS: 23½ units Hours:	14	7	9	13	6	10

* Alternate weeks.
[1] Students who enter fourth year with credit for ELEC 352 will be required to replace ELEC 452 with a 1½-unit technical elective. Credit is given for only one of ELEC 352 and ELEC 452.
[2] Electives total 13½ units with at least 3 units from each of groups A, B and C. Of the remaining 4½ units, at least 1½ must be from electrical engineering, and the additional three units are to be selected from a list made available by the Department in March.

Fourth Year Electives (All are one-term courses except those with †, which are two-term.)

A. **Signals, Communications, Control**
†ELEC 455 (3) Communications Systems
ELEC 460 (1½) Control Systems

ELEC 461 (1½) Non-Linear and Optimum Systems
ELEC 466 (1½) Digital Signal Processing Systems
ELEC 468 (1½) Digital Process Control

B. **Electrophysics**
†ELEC 469 (3) Microwave Engineering
ELEC 470 (1½) Microwave Circuits
†ELEC 477 (3) Solid State Devices
ELEC 483 (1½) Antennas and Propagation

C. **Systems, Technology, Applications**
ELEC 456 (1½) Computer Communications
†ELEC 463 (3) Power Systems Analysis
ELEC 464 (1½) Micro/Mini-Computer System Design
ELEC 472 (1½) Transducers and Advanced Instrumentation and Measurement
ELEC 476 (1½) Introduction to Computer Architecture
ELEC 478 (1½) Computer Graphics
ELEC 486 (1½) Optimization Methods for System Design
ELEC 493 (2) Power Electronics
ELEC 495 (2) Industrial Drives

Other Courses
ELEC 490 (1½) Topics in Electrical Engineering I
ELEC 491 (1½) Topics in Electrical Engineering II

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 226 and 227 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 226 and 227 (recommended but not required);
(3) taking 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). Note that for students who enter Engineering directly from high school, some summer courses or additional winter session terms will probably be necessary in order to accommodate the extra load of the 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

The Computer Engineering Option in Electrical Engineering is a modification of the regular Electrical Engineering program in which Computer Science courses replace some of the regular program core courses. 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	3	1	—	—	—
CPSC 210 (1½) Computer Program Design I	—	—	—	3	—	1
ELEC 251 (1½) Circuit Analysis I	2	—	2	—	—	—
ELEC 253 (1½) Circuit Analysis II	—	—	—	2	—	2
ELEC 254 (1½) Electronic Circuits I	—	—	—	3	—	1
ELEC 256 (1½) Digital Logic Design	2	—	2	—	—	—
ELEC 259 (1½) Introduction to Microcomputers	—	—	—	2	—	2
ELEC 280 (1) Electrical Laboratory I	—	3	—	—	—	—
ELEC 281 (1) Electrical Laboratory II	—	—	—	—	3	—
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	—	—
†Complementary Studies Electives (3)	3	—	—	3	—	—
TOTALS: 21½ units Hours:	16	6	5	19	3	6

† Please refer to the statement headed "Complementary Studies Courses" above.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
CPSC 310 (1½) Software Engineering	3	—	—	—	—	—
CPSC 319 (1½) Software Engineering Project	1	—	—	1	—	3
ELEC 261 (1½) Engineering Electromagnetics	3	—	1	—	—	—
ELEC 315 (1½) Intro. to Operating Systems	—	—	—	3	—	1
ELEC 320 (1½) Intro. to Discrete Structures	2	—	2	—	—	—
ELEC 351 (1½) Physical Microelectronics	2	—	2	—	—	—
ELEC 356 (1½) Electronic Circuits II	2	—	2	—	—	—
ELEC 359 (1½) Signals and Communications	3	—	1	—	—	—
ELEC 360 (1½) Systems and Control	—	—	—	3	—	1
ELEC 364 (2) Electromagnetic Fields and Waves	—	—	—	3	—	2
ELEC 367 (1½) Measurements and Instrumentation	—	—	—	2	3*	—
ELEC 380 (2) Electrical Laboratory III	—	6	—	—	—	—
ENGL 301 (1½) Practical Writing	—	—	—	3	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	—	—
TOTALS: 22 units Hours:	16	6	8	18	1½	7

* Alternate weeks.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
CPSC 416 (1½) Distributed Systems	3	—	—	—	—	—
ELEC 450 (1½) Economic Analysis of Engineering Projects	3	—	—	—	—	—
ELEC 456 (1½) Computer Communications	3	—	1	—	—	—
ELEC 464 (1½) Micro/Mini-Computer System Design	2	—	2	—	—	—
ELEC 474 (2) Systems Laboratory I	—	6	—	—	—	—
ELEC 475 (2) Systems Laboratory II	—	—	—	—	6	—
ELEC 476 (1½) Computer Architecture	—	—	—	3	—	1
ELEC 498 (1) Engineering Report	—	—	—	—	—	—
Complementary Studies Elective (1½)	—	—	—	3	—	—
Computer Engineering Electives[1] (7½)	5	—	3	6	—	6
Elective[3] (1½)	—	—	—	3	—	—
TOTALS: 23½ units Hours:	17	6	6	15	6	7

[1] **Fourth Year Computer Engineering Electives**

The following is a list of suggested elective courses. Other courses may be substituted with the approval of the Computer Engineering Option Adviser.

ELEC 371 (1½) Power Circuits and Devices
ELEC 372 (1½) Rotating Machines
ELEC 452[2] (1½) Electrical Engineering Materials
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) Computer Graphics
CPSC 311 (1½) Definition of Programming Languages
CPSC 312 (1½) Symbolic Computing
CPSC 322 (1½) Introduction to Artificial Intelligence
CPSC 404 (1½) Introduction to Database Management Systems
CPSC 411 (1½) Introduction to Compiler Construction
CPSC 415 (1½) Advanced Operating Systems
CPSC 422 (1½) Intelligent Systems

[2] Credit is given for only one of ELEC 352 and ELEC 452.
[3] Must be approved by Computer Engineering Adviser.

Computer Science 220 (or ELEC 256 plus ELEC 320) is a prerequisite for Computer Science 311, 312 and 322.

Admission into the second year Computer Engineering Option will be subject to approval by the Computer Engineering Adviser. Promotion to the third year of the Computer Engineering Option from the second year will require a minimum of 60% overall average and a minimum of second class standing in CPSC 118 and CPSC 210. Students who do not meet the academic standards for promotion into the third year of the Computer Engineering option will be able to revert to the regular Electrical Engineering program, with some restrictions in course selections.

Students in the option will be expected to meet the admission requirements for any relevant Computer Science courses.

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. C. I. Godwin, Director, Geological Engineering (Room 102, Department of Geological Sciences, phone: 228-2804).

In the third and fourth years, students can choose their programs from one of three options:

Option I — Minerals and Fuels
Option II — Applied Geophysics
Option III — Geotechnical

Students in Option I are given the choice of focussing on mineral exploration and development, or 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	3	2*	—	—	—	—
GEOL 150 (1½) Earth Science	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	—	—	—
PHYS 270 (1½) Mechanics II	—	—	—	3	—	1
STAT 251 (1½) Elementary Statistics	—	—	—	3	1	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 23 units Hours:	20	6	1	19	6	1

† Please refer to the statement headed "Complementary Studies Courses" above.
* Alternate weeks.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
GEOL 235 (0) Field Techniques	—	—	—	3 days		
GEOL 302 (1½) Igneous Petrology	2	3	—	—	—	—
GEOL 304 (3) Structural Geology	2	3	—	2	3	—
GEOL 305 (1½) Interpretation of Aerial Photographs	—	—	—	2	3	—
GEOL 335 (1½) Field School	AT END OF 3RD YEAR					
GEOL 342 (1½) Groundwater Hydrology	2	2	—	—	—	—
GEOL 351 (1½) Geomorphology	2	2	—	—	—	—
Technical Elective(s) (3)	—	—	—	6	—	—
OPTION I (Minerals and Fuels)						
CIVL 310 (1½) Soil Mechanics I	3	2*	—	—	—	—
GEOL 303 (1½) Metamorphic Petrology	—	—	—	2	3	—
MMPE 201 (1) Introduction to Mining	2	3*	—	—	—	—
MMPE 303 (1) Rock Properties	2	2	—	—	—	—
†Complementary Studies Electives (3)	—	—	—	6	—	—
OPTION II (Applied Geophysics)						
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	—	—	—
†Complementary Studies Electives (1½)	—	—	—	3	—	—
OPTION III (Geotechnical)						
CIVL 215 (1½) Fluid Mechanics	3	—	2	—	—	—
CIVL 310 (1½) Soil Mechanics I	3	2*	—	—	—	—
CIVL 311 (1½) Soil Mechanics II	—	—	—	3	2*	—
MMPE 303 (1) Rock Properties	2	2	—	—	—	—
Complementary Studies Electives (3)	—	—	—	6	—	—
TOTALS:						
Opt. 1 21½ units Hours:	15	14½	—	18	9	—
Opt. 2 23 units Hours:	20	13	3	16	7½	—
Opt. 3 22 units Hours:	16	13	2	19	7	—

* Alternate weeks.
[1] MATH 350 (1½) Complex Variables, may be substituted for MATH 357.
† Please refer to the statement headed "Complementary Studies Courses" above.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
GEOL 499 (3) Thesis[1]	—	3	—	—	3	—
OR						
GEOP 499 (3) Thesis[1]	—	3	—	—	3	—
OPTION I (Minerals and Fuels)						
GEOL 321 (1½) Paleontology I[2]	2	2	—	—	—	—
GEOL 368 (1½) Mineral Exploration and Mining Geology[2,3]	2	2	—	—	—	—
GEOL 418 (3) Mineral Deposits[2]	2	2	—	2	2	—
GEOL 425 (1½) Geological Evolution of North America	—	—	—	3	—	—
GEOL 445 (1½) Petroleum Geology	2	2	—	—	—	—
GEOL 447 (1½) Coal Geology	—	—	—	2	2	—
GEOP 400 (3) Applied Physics of the Earth	2	2	—	2	2	—
MMPE 396 (1½) Mineral Economics and Mine Valuation	—	—	—	3	—	—
MMPE 403 (1) Underground Rock Mechanics	2	—	—	—	—	—
MMPE 404 (1) Surface Rock Mechanics	—	—	—	2	—	—
Technical Elective(s) (1½)	—	—	—	3	—	—
OPTION II (Applied Geophysics)						
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	—	—
One of:						
MMPE 396 (1½) Mineral Economics and Mine Valuation	—	—	—	3	—	—
CIVL 300 (1½) Engineering Economic Analysis	3	—	—	—	—	—
Two of:						
CIVL 310 (1½) Soil Mechanics I	3	2*	—	—	—	—
GEOL 368 (1½) Mineral Exploration and Mining Geology[3]	2	2	—	—	—	—
GEOL 445 (1½) Petroleum Geology	2	2	—	—	—	—
GEOL 447 (1½) Coal Geology	—	—	—	2	2	—
GEOL 462 (1½) Principles of Geological Engineering	2	2	—	—	—	—
†Complementary Studies Electives (1½)	—	—	—	3	—	—
Technical Electives (4½)	3	—	—	6	—	—
OPTION III (Geotechnical)						
CIVL 300 (1½) Engineering Economic Analysis	3	—	—	—	—	—
CIVL 402 (1½) Engineering Law and Contracts	—	—	—	2	—	—
CIVL 410 (1½) Foundation Engineering I	3	—	—	—	—	—
CIVL 411 (1½) Foundation Engineering II	—	—	—	3	—	—
GEOL 452 (1) Geotechnical Engineering Practice	—	—	—	2	—	—
GEOL 462 (1½) Principles of Geological Engineering	2	2	—	—	—	—
GEOP 400 (3) Applied Physics of the Earth	2	2	—	2	2	—

5. Geological Engineering—Continued

One of:							
MMPE 403 (1) Underground Rock Mechanics		2	—	—	—	—	—
MMPE 404 (1) Surface Rock Mechanics		—	—	—	2	—	—
Technical Elective(s) (4)		3	—	—	5	—	—
TOTALS:							
Core:	4½ units Hours:	1	3	—	—	3	—
PLUS							
Opt. 1:	Fuels						
	15½ units Hours:	13	8	—	12	4	—
	Minerals						
	15½ units Hours:	11	6	—	14	6	—
Opt. 2:	15 units Hours:††	6½	3	—	9½	3	—
Opt. 3:	16½ units Hours:	15	4	—	14	2	—
	OR	13	4	—	16	2	—

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.
†† Core courses only; electives not included.
[1] Options I and III take GEOL 499; Option II takes GEOP 499.
[2] Option I students specializing in Fuels will take GEOL 321 and GEOL 368; those specializing in Minerals will take GEOL 418.
[3] Students in Option I (Fuels) and Option II who choose to take GEOL 418 instead of GEOL 368 will be able to apply the additional 1½ units of credit to their Technical Elective requirement.

6. Mechanical Engineering

In addition to the regular Mechanical Engineering program, there are three options — **Naval Architecture**, **Computer-Aided Automation**, and **Industrial Aerodynamics and Aircraft** — as described below.

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 278 (1½) Engineering Materials	3	2*	—	—	—	—
ELEC 263 (1½) Basic Circuit Analysis	—	—	—	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 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) Thermodynamics I	—	—	—	2	—	1
MECH 280 (1½) Introduction to Fluid Mechanics	3	—	2*	—	—	—
MMAT 380 (1½) Structure and Properties of Materials	—	—	—	3	—	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 20½ units Hours:	19	4	2	19	1	3

* Alternate weeks.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
ELEC 365 (1½) Applied Electronics	—	—	—	2	2*	2*
MATH 357 (1½) Applied Complex Analysis	3	—	2*	—	—	—
MECH 350 (1½) Engineering Design	—	—	—	2	—	2
MECH 355 (1½) Vibration and Stress Measurement	2	3	—	—	—	—
MECH 360 (1½) Mechanics of Materials I	3	—	—	—	—	—
MECH 365 (1½) Machine Dynamics and Vibrations	3	—	—	—	—	—
MECH 370 (1) Thermodynamics II	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 392 (1) Manufacturing Processes	—	—	—	2	—	—
MECH 398 (1) Engineering Report	—	—	2	—	—	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 21½ units Hours:	19	3	4	17	3½	4

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.

FOURTH YEAR

Students pre-register for Fourth Year courses with a faculty adviser towards the end of the Third Year. Each student takes 15 units as a core in the Fourth Year, and chooses a minimum of 6 units of Technical Electives.

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
ELEC 370 (1½) Electrical Machines & Power Transmission	—	—	—	2	2*	1
MECH 450 (1½) Design I	2	—	3	—	—	—
MECH 451 (1½) Design II	—	—	—	2	—	3
MECH 457 (3) Mechanical Engineering Project	—	3	—	—	3	—
MECH 460 (1½) Mechanics of Materials II	—	—	—	3	—	—
MECH 465 (1½) Mechanical Vibrations	—	—	—	3	—	—
MECH 466 (2) Automatic Control	3	2*	—	—	—	—
MECH 470 (1) Thermal Power Generation	2	—	1	—	—	—
MECH 475 (1) Heat Transfer II	2	—	1	—	—	—
Technical Elective (6)	6	—	—	6	—	—
Technical Electives must be chosen from the following list.‡						
TOTALS: 21 units Hours††:	16	4	5	16	4	4

Fourth Year Electives†

CPSC 350 (1) Programming of Numerical Algorithms
MATH 400 (3) Applied Analysis II
MMAT 494 (1) Composite Materials I
CHML 471 (1) Mechanical Pulping and Paperworking Technology
MECH 410 (1-3)**d** Special Topics in Mechanical Engineering
MECH 441 (1½) Computer Aided Ship Design
MECH 442 (1½) Ship Structures and Vibrations
MECH 443 (1½) Experimental Naval Architecture
MECH 453 (1) Friction, Wear and Lubrication
MECH 454 (1) Fluid Film Lubrication
MECH 461 (1) Experimental Mechanics
MECH 462 (1½) Finite Element Analysis
MECH 467 (1½) Advanced Dynamics
MECH 468 (1½) Modern Control Engineering
MECH 473 (1) Heating, Ventilating and Air Conditioning
MECH 474 (1) Solar Energy Utilization
MECH 480 (1½) Computational Fluid Dynamics
MECH 481 (1½) Aerodynamics of Aircraft I
MECH 482 (1½) Wind Engineering
MECH 483 (1½) Aerodynamics of Aircraft II
MECH 490 (1½) Production Engineering
MECH 491 (2) Computer Aided Manufacturing
MECH 495 (1½) Industrial Engineering
MECH 496 (1½) Engineering Management

* Alternate weeks.
† Some electives may not be offered in a given year.
‡ With the approval of the Department 1½ units of technical electives may be chosen outside the Department or from MECH graduate courses.
†† Core courses only; electives not included.

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. Students who satisfactorily complete this program will be given recognition as receiving the B.A.Sc. in Mechanical Engineering (Naval Architecture Option).

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
MATH 357 (1½) Applied Complex Analysis	3	—	2*	—	—	—
MECH 340 (1½) Statistics of Marine Vehicles	3	—	—	—	—	—

6. Naval Architecture Option—Continued

MECH 341 (1½) Ship Resistance and Propulsion	—	—	—	3	—	—
MECH 350 (1½) Engineering Design	—	—	—	2	—	2
MECH 355 (1½) Vibration and Stress Measurement	2	3	—	—	—	—
MECH 360 (1½) Mechanics of Materials	3	—	—	—	—	—
MECH 365 (1½) Machine Dynamics and Vibrations	3	—	—	—	—	—
MECH 370 (1) Thermodynamics II	2	—	1	—	—	—
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 392 (1) Manufacturing Processes	—	—	—	2	—	—
MECH 398 (1) Engineering Report	—	—	2	—	—	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 22½ units Hours:	22	3	4	18	1	3

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (1½) Professional Engineering Practice	1	—	—	—	—	—
ELEC 365 (1½) Applied Electronics	—	—	—	2	2*	2
ELEC 370 (1½) Electrical Machines and Power Transmission	—	—	—	2	2*	1
MECH 441 (1½) Computer Aided Ship Design	—	—	—	2	2	—
MECH 442 (1½) Ship Structures and Vibration	—	—	—	3	—	1
MECH 443 (1½) Experimental Naval Architecture	1	2	1	—	—	—
MECH 450 (1½) Design I	2	—	3	—	—	—
MECH 451 (1½) Design II	—	—	—	2	—	3
MECH 457 (3) Mechanical Engineering Project	—	3	—	—	3	—
MECH 465 (1½) Mechanical Vibrations	—	—	—	3	—	—
MECH 470 (1) Thermal Power Generation	2	—	1	—	—	—
Technical Elective (3)†	6	—	—	—	—	—
TOTALS: 20½ units Hours:	12	5	5	14	7	7

* Alternate weeks.
† Technical Electives must be chosen in consultation with the option director.

Computer-Aided Automation Option

By taking the following modified program in Third and Fourth Years, students can complete the requirements of this option in Mechanical Engineering. Students who satisfactorily complete this program will be given recognition as receiving the B.A.Sc. in Mechanical Engineering (Computer-Aided Automation Option).

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 380 (1½) Introduction to Microcomputers	—	—	—	2	3*	2*
CPSC 118 (1½) Principles of Computer Programming	—	—	—	3	3	1
ELEC 365 (1½) Applied Electronics	—	—	—	2	2*	2*
MATH 357 (1½) Applied Complex Analysis	3	—	2*	—	—	—
MECH 350 (1½) Engineering Design	—	—	—	2	—	2
MECH 355 (1½) Vibration and Stress Measurement	2	3	—	—	—	—
MECH 360 (1½) Mechanics of Materials I	3	—	—	—	—	—
MECH 365 (1½) Machine Dynamics and Vibration	3	—	—	—	—	—
MECH 370 (1) Thermodynamics II	2	—	1	—	—	—
MECH 371 (½) Thermodynamics Laboratory	—	—	—	—	3*	—
MECH 390 (1½) Engineering Data Analysis	3	—	—	—	—	—
MECH 392 (1) Manufacturing Processes	—	—	—	2	—	—
MECH 466 (2) Automatic Control	3	2*	—	—	—	—
†Complementary Studies Elective (3)	—	—	—	—	—	—
TOTALS: 21 units Hours:††	19	4	2	11	7	5

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above.
†† Core courses only; electives not included.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
ELEC 359 (1½) Signals and Communications	3	—	1	—	—	—
ELEC 370 (1½) Electrical Machines and Power	—	—	—	2	2*	1
ELEC 468 (1½) Digital Process Control	—	—	—	2	—	2
MECH 375 (1) Heat Transfer I	—	—	—	2	—	1
MECH 391 (1½) Industrial Systems	—	—	—	3	—	—
MECH 398 (1) Engineering Report	—	—	2	—	—	—
MECH 450 (1½) Design I	2	—	3	—	—	—
MECH 455 (1½) Mechanical Project I	—	3	—	—	—	—
or	—	—	—	—	3	—
MECH 456 (1½) Mechanical Poject II	—	—	—	—	3	—
or	—	3	—	—	—	—
MECH 465 (1½) Mechanical Vibrations	—	—	—	3	—	—
MECH 490 (1½) Production Engineering	3	—	—	—	—	—
Technical Electives (4)	—	—	—	—	—	—
TOTALS: 20 units Hours:††	9	3	6	12	4	4

* Alternate weeks.
†† Core courses only; electives not included.

Admission into the Computer-Aided Automation Option is limited to students with high academic standing. Interested students are encouraged to apply to the Department. This option can be taken only as a year-round Co-operative Education Program — see Index for "Co-operative Education, Engineering."

Industrial Aerodynamics and Aircraft Option

By taking special sections of existing courses in their third and fourth years (such as MECH 350, 455, 456), and by choosing their electives from the following list of courses:

MECH 453 (1) Fluid Film Lubrication
MECH 473 (1) Heating, Ventilating, Air Conditioning
MECH 480 (1½) Computational Fluid Dynamics
MECH 481 (1½) Aerodynamics of Aircraft I
MECH 482 (1½) Wind Engineering
MECH 483 (1½) Aerodynamics of Aircraft II
MECH 484 (1½) Aircraft Stability and Control
MECH 485 (1½) Aircraft Design and Manufacture
MECH 486 (1½) Fluid Flow in Industrial Equipment

and from other electives, chosen in consultation with the option director, students may complete the requirements of the Industrial Aerodynamics and Aircraft Option in Mechanical Engineering. Students who satisfactorily complete this program will be given recognition on their transcripts as receiving the B.A.Sc. in Mechanical Engineering.

This option can be taken only as part of the year-round co-operative industry/university education program as described below.

Admission to the Industrial Areodynamics and Aircraft Option is limited to students with high academic standing. Interested students are encouraged to apply to the Department.

7. Metals and Materials 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*
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	—	—

7. Metals and Materials Engineering—Continued

MECH 260 (1½) Introduction to Mechanics of Materials	3	—	1	—	—	—
MMAT 262 (1) Metallurgical Process Calculations I	1	—	2	—	—	—
MMAT 264 (1½) Metallurgical Process Calculations II	—	—	—	3	3*	—
MMAT 280 (1) Engineering Materials II	—	—	—	2	—	—
PHYS 270 (1½) Mechanics II	3	—	1	—	—	—
STAT 251 (1½) Elementary Statistics	—	—	—	3	1	—
†Complementary Studies Electives (3)	3	—	—	3	—	—
TOTALS: 20 units Hours:	19	1	4	20	2½	1

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
MMAT 350 (1½) Met. Thermodynamics I	—	—	—	3	—	—
MMAT 352 (2½) Process Metallurgy	2	3	2*	—	—	—
MMAT 360 (1) Heat Transfer	2	—	—	—	—	—
MMAT 362 (1) Mass Transfer	—	—	—	2	—	—
MMAT 370 (1½) Structure of Metals I	3	—	—	—	—	—
MMAT 374 (1½) Deformation Processes	—	—	—	2	3*	—
MMAT 376 (2) Structure and Properties of Steel	3	3*	—	—	—	—
MMAT 378 (1½) Phase Transformation and Solidification	—	—	—	3	—	—
MMAT 382 (1½) Ceramics I	—	—	—	2	3	—
MMAT 390 (½) Seminar I	—	—	1	—	—	1
MMAT 398 (½) Engineering Report	—	—	—	—	—	—
†Complementary Studies Electives (3)	3	—	—	3	—	—

Plus 3½ units of electives which must be approved by the Department Head or Faculty Adviser. The following electives are offered in the Department. Other electives may be selected from the fourth year program or from the offerings of other departments.

‡MMAT 361 (1½) Application of Numerical Methods to Materials Engineering	—	—	—	2	—	2*
MMAT 391 (1) Polymers	—	—	—	2	—	—
TOTALS: 21½ units Hours:††	13	4½	2	15	4½	1

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above. Information regarding prerequisites for fourth year courses will be provided during registration.
‡ Students intending to take option A in the fourth year must take MMAT 361 as one of their electives.
†† Core courses only; electives not included.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Professional Engineering Practice	1	—	—	—	—	—
MMAT 450 (2) Metallurgical Thermodynamics II	3	—	2	—	—	—
MMAT 456 (1) Corrosion Engineering	2	—	—	—	—	—
MMAT 466 (1½) Metallurgical Engineering Economics	—	—	—	2	—	3*
MMAT 470 (1) Engineering Alloys	—	—	—	2	—	—
MMAT 490 (½) Seminar II	—	—	1	—	—	1
MMAT 495 (1½) Metallurgical Laboratory	—	—	—	—	5	—
MMAT 498 (½) Engineering Report	—	—	—	—	—	—
MMAT 499 (1½) Research or Design Project	—	3	—	—	3	—

Plus one of Option A or Option B

Option A: Materials Processing

CHML 356 (1½) Control of Process Variables	—	—	—	3	—	—
MMAT 452 (1) Iron and Steelmaking	2	—	—	—	—	—
MMAT 458 (1) Hydrometallurgy	—	—	—	2	—	—
MMAT 462 (1) Process Modelling	2	—	—	—	—	—
MMAT 483 (1) Processing of Ceramics and Composites	—	—	—	2	—	—

Option B: Materials Science and Engineering

MMAT 478 (1) Electronic Materials	—	—	—	2	—	—
MMAT 480 (1) Fracture	—	—	—	2	—	—
MMAT 482 (1½) Ceramics II	3	—	—	—	—	—
MMAT 488 (1) Strengthening in Alloy Systems	2	—	—	—	—	—
MMAT 494 (1) Composite Materials I	2	—	—	—	—	—

Plus 6 units of approved technical electives of which at least 3 units must be selected from the other option and/or the following list of Metals and Materials Engineering electives:

MMAT 454 (1) Reactive Metal Processing	—	—	—	2	—	—
MMAT 468 (1) Thermodynamics Problems	—	—	—	1	—	2
MMAT 472 (1½) Welding and Joining	2	3*	—	—	—	—
MMAT 474 (1) Mechanical Working	—	—	—	2	—	—
MMAT 476 (1) Casting of Metals	—	—	—	2	—	—
MMAT 484 (1) Refractory Practice and Problems in Metallurgical Industries	2	—	—	—	—	—
MMAT 486 (1) Nuclear Materials	—	—	—	2	—	—
MMAT 492 (1) Powder Metallurgy	2	—	—	—	—	—

TOTALS:								
Opt. A:	21½ units	Hours:††	10	3	3	11	8	2½
Opt. B:	21½ units	Hours:††	13	3	3	8	8	2½

* Alternate weeks.
†† Core courses only; electives not included.

8. Mining and Mineral Process Engineering

SECOND YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	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) Basic Circuit Analysis	—	—	—	2	2*	1
GEOL 150 (1½) Earth Science for Engineers	3	2	—	—	—	—
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 270 (1½) Mechanics II	—	—	—	3	—	1
STAT 251 (1½) Elementary Statistics	—	—	—	3	1	—
TOTALS: 23½ units Hours:	22	6½	4	19	2	2

* Alternate weeks.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
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) Mine Services	—	—	—	3	2	—
MMPE 303 (1½) Rock Properties	2	2	—	—	—	—
MMPE 304 (1) Rock Fragmentation	—	—	—	2	—	—
MMPE 331 (2) Unit Operations I	3	3	—	—	—	—
MMPE 332 (1½) Unit Operations II	—	—	—	2	3*	—
MMPE 333 (1½) Flotation	—	—	—	2	3	—
MMPE 393 (½) Seminar	—	—	1	—	—	1
MMPE 394 (1) Engineering Report	—	—	—	—	—	—
MMPE 395 (1) Computer Applications in Mining & Mineral Processing	2	—	1	—	—	—
MMPE 396 (1½) Mineral Economics and Mine Valuation	—	—	—	3	—	—
†Complementary Studies Electives (3)	3	—	—	3	—	—
TOTALS: 21 units Hours:	15	8½	2	17	9½	1

* Alternate weeks.
† Please refer to the Statement headed "Complementary Studies Courses" above.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
Core Subjects:						
APSC 450 (½) Prof. Engineering Practice ..	1	—	—	—	—	—
MMPE 401 (1½) Mine Design	2	3	—	—	—	—
MMPE 431 (1½) Plant Design	—	—	—	2	3	—
MMPE 434 (1) Processing of Precious Metal Ores	2	—	—	—	—	—
MMPE 450 (1) Design Project Synthesis ...	1	—	2	—	—	—
MMPE 492 (½) Field Trip						
MMPE 493 (½) Seminar	—	—	1	—	—	1
MMPE 494 (3) Thesis/Report	—	3	—	—	6	—
MMPE 495 (1) Systems (Processing)	2	—	1	—	—	—
MMPE 496 (1) Systems (Mining)	—	—	—	2	—	1
MMPE 498 (1½) Materials Handling	2	3*	—	—	—	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
Mining Option:						
MMPE 402 (1½) Mine Ventilation	2	2*	—	—	—	—
MMPE 403 (1) Underground Rock Mechanics	2	—	—	—	—	—
MMPE 404 (1) Surface Rock Mechanics ...	—	—	—	2	—	—
MMPE 461 (1) Coal Mining Technology ...	—	—	—	2	—	—
*Plus a minimum of 1 unit of technical electives.						
Mineral Processing Option:						
MMAT 351 (1) Process Metallurgy	2	—	—	—	—	—
MMPE 432 (1) Control of Min. Proc.	—	—	—	2	2	—
MMPE 433 (1½) Surface Properties	2	3	—	—	—	—
MMPE 462 (1½) Coal Prep. Technology ...	2	3	—	—	—	—
**Plus a minimum of ½ a unit of technical electives.						
TOTALS:						
Core: 16 units Hours:	13	7½	4	7	9	2
PLUS:						
Mining Option: 5½ units Hours:††	4	1	—	4	—	—
Mineral Processing Option: 5½ units Hours:††	6	6	—	2	2	—

* Alternate weeks.
** Other technical electives may be selected with the approval of the Department.
† Please refer to the statement headed "Complementary Studies Courses" above.
†† Core courses only; electives not included.

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.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 278 (1½) Engineering Materials	3	2*	—	—	—	—
ELEC 251 (1½) Circuit Analysis I	2	—	2	—	—	—
ELEC 253 (1½) Circuit Analysis II	—	—	—	2	—	2
MATH 253 (1½) Multivariable Calculus ...	3	—	—	—	—	—
MATH 254 (1½) Vector Calculus	—	—	—	3	—	—
MATH 255 (1½) Ordinary Differential Equations	—	—	—	3	—	—
MECH 280 (1½) Introd. to Fluid Mechanics	—	—	—	3	—	2*
PHYS 156 (1½) Heat and Thermodynamics	2	3*	1	—	—	—
PHYS 250 (2) Introd. to Modern Physics	—	—	—	3	3	1
PHYS 270 (1½) Mechanics II	3	—	1	—	—	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
TOTALS: 18½ units Hours:	16	2½	4	17	3	4

* Alternate weeks.

THIRD YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
Core						
APSC 278 (1½) Engineering Materials	3	2*	—	—	—	—
ELEC 254 (1½) Electronic Circuits I	—	—	—	3	—	1
MATH 257 (1½) Partial Differential Equations	3	—	—	—	—	—
MATH 307 (1½) Linear Algebra	—	—	—	3	—	—
PHYS 251 (2) Int. to Elect. & Magn.	3	3	1	—	—	—
PHYS 352 (1) Phys. Lab.	—	—	—	—	3	—
STAT 251 (1½) Statistics	—	—	—	3	1	—
†Complementary Studies Elective (3)	3	—	—	3	—	—
Choose one of the following Options:						
OPTION A						
CPSC 210 (1½) Comp. Prog. Design I	—	—	—	3	—	—
ELEC 256 (1½) Digital Logic Design	2	—	2	—	—	—
ELEC 259 (1½) Digital Systems	—	—	—	2	—	2
ELEC 281 (1) Elec. Eng. Lab II	—	—	—	—	3	—
OPTION B						
MECH 250 (1½) Eng. & Comp. Graph	1	3	—	—	—	—
MECH 260 (1½) Int. to Mech. of Mat.	3	—	1	—	—	—
MMAT 280 (1) Eng. Mtls. II	—	—	—	2	—	—
TOTALS:						
Opt. A: 19 units Hours:	14	4	3	17	7	3
Opt. B: 17½ units Hours:	16	7	2	14	4	1

† Please refer to the statement headed "Complementary Studies Courses" above.
* Alternate weeks.
Note: MATH 300 has been moved from Third Year to Fourth Year and will appear in the Fourth Year program in 1991-92.

FOURTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 459 (2) Proj. Lab.	—	—	1*	—	6	1
PHYS 351 (1½) Electromag. Theory	3	—	—	—	—	—
PHYS 398 (1) Tech. Essay	—	—	—	—	—	—
PHYS 452 (1½) Quantum Mech.	3	—	—	—	—	—
PHYS 455 (1½) Thermodyn. & Stat. Mech.	—	—	—	3	—	—
And one of:						
PHYS 456 (1½) App. Class. Mech.	—	—	—	3	—	—
PHYS 458 (2) Appl. Optics	1	3*	—	2	3*	—
Choose one of the following options:						
OPTION 1: "ELEC"						
ELEC 351 (1½) Physical Micro-Elec.	2	—	2	—	—	—
ELEC 356 (1½) Elec. Circ. II	2	—	2	—	—	—
ELEC 359 (1½) Comm. Syst.	3	—	1	—	—	—
ELEC 360 (1½) Syst. & Controls	—	—	—	3	—	1
At least four units of technical electives normally relevant to Electrical Engineering, and chosen in consultation with the Director of Engineering Physics.						
OPTION 2: "MECH"						
ELEC 367 (1½) Elec. Meas. & Elect. Instr.	—	—	—	2	3*	—
MECH 365 (1½) Mach. Dyn. & Vibr.	3	—	—	—	—	—
MECH 375 (1) Heat Transfer I	—	—	—	2	—	1
MECH 360 (1½) Mech. of Mat. I	3	—	—	—	—	—
MECH 370 (1) Eng. Thermodyn.	2	—	1	—	—	—
At least 3 units of technical electives normally relevant to Mechanical Engineering, and chosen in consultation with the Director of Engineering Physics.						
OPTION 3: "METL"						
ELEC 367 (1½) Elec. Meas. & Elec. Instr.	2	3*	—	—	—	—
MMAT 360 (1) Heat Transfer	2	—	—	—	—	—
MMAT 370 (1½) Str. of Metals I	3	—	—	—	—	—
MMAT 374 (1½) Deform. Process	—	—	—	2	3*	—
MMAT 376 (1½) Steel	3	3*	—	—	—	—
MMAT 378 (1½) Phase Trans. & Solid.	—	—	—	3	—	—
At least 1½ units of technical electives of relevance to Metallurgy and chosen in consultation with the Director of Engineering Physics.						

9. Engineering Physics—Continued

OPTION 4: "GEOP"

ELEC 367 (1½) Elec. Meas. & Electr. Instr.	2	3*	—	—	—	—
GEOP 320 (1½) Int. to Theory. Geop.	3	—	—	—	—	—
GEOP 321 (1½) Seismology	—	—	—	3	3*	—
GEOP 322 (1½) Time Series Analysis	3	—	1	—	—	—

At least 4 units of technical electives, 3 units of which should be from Computer Science or an Engineering discipline related to Geophysics, chosen in consultation with the Director of Engineering Physics.

OPTION 5: "CPSC"

CPSC 220 (1½) Int. to Disc. Struc.	3	—	1	—	—	—
CPSC 315 (1½) Int. to Op. Sys.	—	—	—	3	1	—
CPSC 118 (1½) Machine Struct.	—	—	—	3	—	1

At least 6 units of technical electives from Engineering disciplines relevant to Computer Science, chosen in consultation with the Director of Engineering Physics.

OPTION 6: "OCGY"

ELEC 367 (1½) Elec. Meas. & Electr. Instr.	2	3*	—	—	—	—
MECH 380 (2) Fluid Dynamics	—	—	—	3	2	—
OCGY 308 (1½) Int. to Ocgy. I	3	—	—	—	—	—
OCGY 309 (1½) Int. to Ocgy. II	—	—	—	3	—	—
OCGY 408 (1½) Ocean. Methods	—	—	—	3	—	—

At least 2 units of technical electives from an Engineering discipline, chosen in consultation with the Director of Engineering Physics.

TOTALS:							
Core:	9	units	Hours:	6	—	½	6	6	1
OR	9½	units	Hours:	7	1½	½	5	7½	—
PLUS:									
Opt. 1:	10	units	Hours:††	7	—	5	3	—	1
Opt. 2	9½	units	Hours:††	8	—	1	4	1½	1
Opt. 3	10	units	Hours:††	10	3	—	5	1½	—
Opt. 4	10	units	Hours:††	8	1½	1	3	1½	—
Opt. 5	10½	units	Hours:††	3	—	1	6	1	1
Opt. 6	10	units	Hours:††	5	1½	—	9	2	—

†† Core courses only; electives not included.
* Alternate weeks.

FIFTH YEAR

Subject	First Term Lect.	Lab.	Prob.	Second Term Lect.	Lab.	Prob.
APSC 450 (½) Prof. Eng. Practice	1	—	—	—	—	—
APSC 479 (1½) Project Lab.	—	5	1	—	—	—
MATH 400 (3) Appl. Analysis II	3	—	—	3	—	—
†Complementary Studies Elective (1½)	3	—	—	—	—	—
Free Elective (1½)	—	—	—	3	—	—
Plus two of						
PHYS 473 (1½) Appl. Nucl. Phys.	3	—	1*	—	—	—
PHYS 474 (1½) Appl. Solid State Physics	—	—	—	3	—	—
PHYS 477 (1½) Appl. Plasma Phys.	—	—	—	3	—	—
†PHYS 456 (1½) Appl. Class Mech.	—	—	—	3	—	—
†PHYS 458 (2) Appl. Optics	1	3*	—	2	3*	—

†If not already taken as 4th year core elective.

Plus one of the following options:

OPTION 1: "ELEC"

ELEC 455 (3) Communication Systems	2	—	2	2	—	2
ELEC 460 (1½) Control Systems	2	—	2	—	—	—

At least 3 units of technical electives relevant to Electrical Engineering. Chosen in consultation with the Director of Engineering Physics.

OPTION 2: "MECH"

MECH 450 (1½) Design I	2	—	3	—	—	—
MECH 451 (1½) Design II	—	—	—	2	—	3
MECH 466 (2) Auto. Control	—	—	—	3	2*	—

At least 3 units of technical electives normally of relevance to Mechanical Engineering. Chosen in consultation with the Director of Engineering Physics.

OPTION 3: "METL"

MMAT 470 (1) Engineering Alloys	—	—	—	2	—	—
MMAT 495 (1½) Metall. Lab.	—	—	—	—	5	—

At least 6 units of technical electives, of which not less than 4½ units must be chosen from the following courses. The remaining 1½ units can be courses relevant to Metals and Materials Engineering chosen in consultation with the Director of Engineering Physics.

MECH 450 (1½) Design I	2	—	3	—	—	—
MMAT 472 (1½) Welding & Joining	2	3*	—	—	—	—
MMAT 476 (1) Casting of Metals	—	—	—	2	—	—
MMAT 480 (1) Fracture	2	—	—	—	—	—
MMAT 482 (1½) Ceramics II	—	—	—	3	—	—
MMAT 484 (1) Refractory Practice	2	—	—	—	—	—
MMAT 486 (1) Nucl. Matl.	—	—	—	2	—	—
MMAT 488 (1) Strengthening Alloys	2	—	—	—	—	—
MMAT 492 (1) Powder Metl.	2	—	—	—	—	—
MMAT 494 (1) Comp. Metl.	2	—	—	—	—	—

OPTION 4: "GEOP"

GEOP 420 (1½) Potential Methods	3	—	—	—	—	—
GEOP 421 (1½) App. Geop. Lab.	1*	3	—	1*	3	—
At least one of:						
GEOP 422 (1½) Geop. Inst.	2	3	—	—	—	—
GEOP 426 (1½) Adv. Phys. of Earth	—	—	—	3	—	—

At least 3 units of technical electives (1½ from an Engineering discipline and 1½ from a related discipline), chosen in consultation with the Director of Engineering Physics.

OPTION 5: "CPSC"

6 units of courses from Cp.Sc., chosen in consultation with the Director of Engineering Physics, such as:

CPSC 402 (1½) Num. Lin. Algebr.	3	—	—	—	—	—
CPSC 403 (1½) Num. Sol. Diff. E	—	—	—	3	1	—
CPSC 405 (1½) Mod. & Sim.	3	—	—	—	—	—
CPSC 407 (1½) Comp. Projects & Facilities	—	—	—	3	—	—
CPSC 413 (1½) Intr. Comp. Arch.	—	—	—	3	1	—
CPSC 414 (1½) Intr. Comp. Graph.	3	—	—	—	—	—
CPSC 415 (1½) Advanced Op. Syst.	—	—	—	3	—	—
CPSC 416 (1½) Distr. Syst.	3	—	—	—	—	—
CPSC 417 (1½) Comp. Communic.	3	—	—	—	—	—
CPSC 430 (1½) Computers and Soc.	—	—	—	3	—	—
CPSC 435 (1½) Comp. Image Analy.	—	—	—	2	—	2

At least 1½ units of technical electives from a relevant Engineering discipline chosen in consultation with the Director of Engineering Physics.

OPTION 6: "OCGY"

OCGY 401 (1½) Dyn. Ocgy.	—	—	—	3	—	—
OCGY 449 (3) Ocean. Res.	—	6	—	—	6	—

At least 3 units of technical electives, at least 1½ units of which must be from an Engineering discipline, chosen in consultation with the Director of Engineering Physics.

TOTALS:								
Core:	11 or 11½	units	Hours:††	7	5	1	6	—	—
PLUS:									
Opt. 1:	7½	units	Hours:††	4	—	4	2	—	2
Opt. 2:	8	units	Hours:††	2	—	3	5	1	3
Opt. 3:	8½	units	Hours:††	—	—	—	2	5	—
Opt. 4	7½	units	Hours:††	5½	6	—	½	3	—
			OR	3½	3	—	3½	3	—
Opt. 5:	7½	units	Hours:††	—	—	—	—	—	—
Opt. 6:	7½	units	Hours:††	—	6	—	3	6	—

* Alternate weeks.
† Please refer to the statement headed "Complementary Studies Courses" above, in particular Note 1. An engineering economics course appropriate for the option selected (e.g. ELEC 450 for Option 1) must be taken in this year to satisfy the Complementary Studies requirement.
†† Core courses only; electives not included.

THE CENTRE FOR METALLURGICAL PROCESS ENGINEERING

Director: J. K. Brimacombe, Stelco/NSERC Professor.

The Centre for Metallugical Process Engineering has been established to facilitate and foster research and graduate training related to metals and materials processes. The Centre encompasses processes in both the ferrous and non-ferrous industries from raw materials preparation to metal finishing. Processes for the production of other materials such as ceramics, electronic materials and composites are receiving increasing attention. 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 metals and materials 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 Applied Science (Chairman), the Dean of Graduate Studies and the Head of the Department of Metals and Materials 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.

THE SCHOOL OF ARCHITECTURE

(A School within the Faculty of Applied Science)

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FRANCES SCHMITT, B.F.A., B.Arch. (Brit. Col.).

ANTHONY STEADMAN, F.R.I.C.S., M.C.I.Q.S.

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 B.Arch. degree is a recognized professional degree which is designed to meet the requirements for entrance to the profession of architecture. The School also offers a post-professional graduate degree, Master of Advanced Studies in Architecture, for those persons interested in pursuing research or advanced studies in an area of specialization within the field of architecture.

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 Bachelor of Architecture degree program 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.

For information on the Master of Advanced Studies in Architecture degree program at the University of British Columbia, reference should be made to the Faculty of Graduate Studies section of this 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 Item 2, 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.
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. It should be noted that a First Year Workshop fee of $400 is payable within two weeks of the date of the applicant's acceptance of a position in the First Year of Architecture. $200 of this fee is refundable until July 15th. After August 1, the full fee of $400 is non-refundable.

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 relevant 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.

Students registering in the School of Architecture after a period of absence are subject to the regulations and degree requirements in effect at the time of re-registering. Any deviation from these regulations and requirements must be approved by the Director.

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 Labour Day; involves the study of selected environments in the form 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 1987, 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 units)
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
424 History of Urban Form
or 448 History of Theories of Architecture
or 446 Current Issues in 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: Courses 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

Seven Design Courses (each 4½ units unless noted otherwise)

400 Arch Design 1A
401 Arch Design 1B
420 Arch Design 2A
421 Arch Design 2B
440 Arch Design 3A
498 Graduation Project: Part 1 (1½ units)
499 Graduation Project: Part 2

Total — 28½ units

Four Elective Courses (1½ units each) normally selected from the following list:

424 History of Urban Form
425 History of Urban Planning: Workshop
442 Housing and Community
445 Current Theories of Arch
446 Contemporary Issues in Arch
447 Urban Design Workshop
448 History of Theories of Arch
471 Meaning in Arch
472 Meaning and Behaviour in the Landscape
407 Research Methods in Arch Evaluation
408 Social Aspects of Arch Space
474 Introduction to Facilities Planning
410 Arch Graphics
417 Computer Applications 1
419 Computer Applications 2
485 Special Topics in Arch Technology
430 Arch Acoustics
431 Light, Colour, and Space
455 Energy and Building Design
456 Structures: Special Topics
450 Design Management
451 Process and Practice of Arch 2
458 Arch Seminar
459 Directed Studies

Total — 6 units

Note: A student who enrols in the Study Abroad Program in a year may substitute Arch 461 Study of Arch Abroad for three 1½ unit electives, and Arch 460 Design Abroad for one of the 4½ unit tutorial courses in Arch 420, 421 or 440, so as to make up a full term's work abroad.

PROGRAM TOTAL — 55 units

A student who has valid credit for a course similar to a required lecture course in this program may take an extra elective course in lieu of that required course, but still must complete a total of 55 units in this program.

With the approval of a designated faculty adviser, a student may substitute a course or courses offered by another Department for not more than two electives, providing the course(s) can be shown to be relevant to the program.

Course descriptions are to be found in the alphabetical listings of the Departmental offerings in this Calendar. See the School Handbook for more complete details, including term, time, and location of courses.

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, ARCH 401, ARCH 420, and ARCH 421 (ARCH 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 eight 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.

Should a student not attain a 65% mark in ARCH 440, then the student must repeat the Tutorial.

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 the course to raise his/her average to 65%.

Failure to attain any of the above requirements after two consecutive attempts will require that the student withdraw from the program for 12 months.

Failure to attain any of the above requirements in a total of three attempts will require a student to withdraw from the School, and the student will not be allowed to re-register in the program.

Faculty approval is required, based on a portfolio including work from ARCH 400, 401, 420, and 421 submitted on completion of ARCH 421, before a student may register in ARCH 440. If this approval is not given, 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 demonstration of a "state of readiness" to proceed with the Graduation Project. Those students who have not maintained an average grade for ARCH 400, ARCH 401, ARCH 420, and ARCH 421 of 65% may be required to repeat ARCH 421. Other students may be advised to repeat ARCH 421.

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)

Research, Preparation and Definition of the Graduation Project

In order to enrol in ARCH 498, a student must have successfully completed all the requirements for second year. Each student enrolled in ARCH 498 will select a member of faculty from a published list to act as a Mentor for the project. The Mentor must approve the topic and agree on the approach. A LETTER OF INTENT, approved by the Mentor, must be submitted by the end of the first week of term. A PROPOSAL for a specific project, approved by the Mentor, must be submitted by the end of the seventh week of term. The ARCH 498 REPORT is due on the last day of course work for the term.

The ARCH 498 REPORT must be completed in one term and a grade assigned prior to the marks meeting of that term. Should the work be incomplete a FAIL grade will automatically be assigned. The student may then re-register for ARCH 498 in the following term.

If the ARCH 498 REPORT is not completed and graded with a satisfactory standing at the end of the term in which it was started, the student may not proceed with ARCH 499 in the following term. Failure to complete ARCH 498 after two attempts will require that the student withdraw from the program for 12 months.

Graduation Project, Part 2 (Arch. 499)

Design and Presentation of the Graduation Project

No student will be permitted to proceed with ARCH 499 until the student has passed ARCH 498 and reduced any outstanding course requirements to a maximum of nine units.

Each student enrolled in ARCH 499 shall work under the supervision of a Committee, the Chairperson of which will normally be the Mentor from ARCH 498, or else a member of the faculty chosen from the published list. The student, with the approval of the Chairperson, will select two additional members for the Committee who may be from the School faculty or the community at large. Under the direction of the Chairperson, the student will call a minimum of four 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 TERM-END MEETING, to be held by the last day of course work for the term, the Committee will determine whether the project is substantially complete, and is to be prepared for presentation.

At the TERM-END MEETING the following conditions apply: students whose work is judged to be substantially complete and of acceptable quality will be required to make a public presentation of their work at the FINAL REVIEW on a date scheduled by the School. Work that is not of an acceptable standard will be assigned a FAIL grade. Should the Committee decide that the project is not substantially complete it may either assign a fail grade or, alternatively, it may give the student permission to work on the project until a date published by the School. At this date, the student may make a presentation to the Committee and an assigned group of faculty and request an extension. At this time the Committee may, only with the agreement of the assigned faculty, allow the student to re-register for the next consecutive term and continue work on the project. The student must complete the project by the end of that term or else a FAIL grade will be assigned.

All students eligible to do so must exhibit their projects at the PREVIEW EXHIBITION scheduled just prior to FINAL REVIEW. Students whose substantially complete projects are considered by their Committee to be inadequately presented may not be allowed to proceed to FINAL REVIEW, and will be required to upgrade the presentation for the next PREVIEW EXHIBITION.

At the FINAL REVIEW, the grade for ARCH 499 will be established by the Committee in consultation with the assigned group of faculty and guest critic, immediately following the public presentation. In order to obtain credit for the course, the student must attain a mark of not less than 65%.

To complete the requirements for graduation, the work in the courses, ARCH 498 and 499, including reductions of all the presentation drawings, must be summarized and put together in a single REPORT ON THE GRADUATION PROJECT. One copy of the approved Report, initialled by the Chairperson of his/her Committee, must be deposited in the School Office by the specified date for file in the School of Architecture Reading Room. Failure to submit an approved report by the specified date will prevent the student from graduation at that convocation.

If a FAIL grade or no credit is assigned for ARCH 499, the student will be required to withdraw from the School for a minimum period of twelve months. The student may then re-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 acceptable to the new Committee Chairperson without credit, prior to re-registering.

Failure to attain the necessary requirements after repeating ARCH 499 will require the student to withdraw from the School, and the student will not be allowed to re-register in the program.

Should the program not be completed 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 it has been reviewed by the Director of the School of Architecture.

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.

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 developments relates to academic qualifications. The Provincial Associations (except Quebec) have established the Canadian Architectural 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 Architectural Act in B.C. requires a minimum of three years of experience in the employ of an architect subsequent to certification. During this 'internship' period, candidates are required to enrol in the Architect-In-Training Program administered by the Examining Board of the A.I.B.C.

Passing the prescribed Registration Examinations 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. 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 Arch 406, Introductory Workshop.

Students electing to participate in the Study Abroad program must be prepared to meet further expenses.

THE DEGREE OF MASTER OF ADVANCED STUDIES IN ARCHITECTURE (M.A.S.A.)

(See Faculty of Graduate Studies)

THE FACULTY OF ARTS

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HARVEY MITCHELL, B.A. (Manitoba), M.A. (Minnesota), Ph.D. (London).
JOHN M. NORRIS, M.A. (Brit. Col.), Ph.D. (Northwestern).
ARTHUR J. RAY, M.S., Ph.D. (Wisconsin).
ALLEN A. SINEL, B.A. (Yale), A.M., Ph.D. (Harvard).
EDGAR WICKBERG, M.A. (Oklahoma), Ph.D. (Calif., Berkeley).
JAMES H. WINTER, B.A. (Dartmouth), A.M., Ph.D. (Harvard).
ALEXANDER B. WOODSIDE, B.A. (Toronto), A.M., Ph.D. (Harvard).

Associate Professors
RODERICK J. BARMAN, M.A. (Cantab.), Ph.D. (Calif., Berkeley).
GEORGE W. EGERTON, B.A. (Manitoba), M.A. (Minnesota), Ph.D. (Toronto).
A. JEAN ELDER, B.A. (Toronto), Ph.D. (Bryn Mawr).
CHRISTOPHER R. FRIEDRICHS, A.B. (Columbia), M.A., Ph.D. (Princeton).
CHARLES W. HUMPHRIES, B.A. (McMaster), M.A., Ph.D. (Toronto).
E. J. HUNDERT, B.A. (City College of New York), M.A. (New York), Ph.D. (Rochester).
DANIEL M. KLANG, A.B. (Calif., Berkeley), Ph.D. (Princeton).
FRITZ LEHMANN, A.B. (Oberlin), M.S., M.A., Ph.D. (Wisconsin).
A. NORBERT MacDONALD, B.Sc., B.A. (Acadia), M.A. (Brown), Ph.D. (Washington).
PETER N. MOOGK, M.A., Ph.D. (Toronto).
DIANNE NEWELL, B.Sc. (Ottawa), M.A. (Carleton), Ph.D. (Western Ontario).
ALLAN SMITH, B.A. (Manitoba), M.A., Ph.D. (Toronto).
CHRISTOPHER W. STOCKER, B.A. (Carleton), Ph.D. (Cornell).
MURRAY M. TOLMIE, B.A. (Dalhousie), M.A. (Oxon.), Ph.D. (Harvard).
W. ALAN TULLY, B.A. (Queen's), M.A. (Toronto), Ph.D. (Johns Hopkins).
W. PETER WARD, M.A. (Alberta), Ph.D. (Queen's).
WILLIAM D. WRAY, B.A., M.A. (Manitoba), A.M., Ph.D. (Harvard).

Assistant Professors
JAMES P. HUZEL, B.A. (Toronto), M.A. (Sussex), Ph.D. (Kent).
PAUL L. KRAUSE, M.A., Ph.D. (Duke).
ROBERT A. J. McDONALD, B.A., M.A. (Manitoba), Ph.D. (Brit. Col.).
STEPHEN M. STRAKER, B.S. (Antioch), Ph.D. (Indiana).

Lecturer from another Department
BOGDAN CZAYKOWSKI, Professor of Slavonic Studies.

Department of Linguistics

Professor and Head
DAVID INGRAM, B.S. (Georgetown), Ph.D. (Stanford).

Professors
M. DALE KINKADE, M.A. (Washington), Ph.D. (Indiana).
BERNARD SAINT-JACQUES, L. ès L. (Montreal), M.A. (Sophia, Tokyo), M.Sc. (Georgetown), Docteur ès Lettres et Sciences Humaines (Paris).

Associate Professors
GUY CARDEN, A.B., Ph.D. (Harvard).
PATRICIA A. SHAW, B.A. (Manitoba), M.A., Ph.D. (Toronto).

Assistant Professor
MICHAEL ROCHEMONT, B.A. (McGill), Ph.D. (Massachusetts).

Senior Instructor
INGRIDA BRENZINGER, M.A. (Brit. Col.).

Lecturers from other Departments
ANDRE-PIERRE BENGUEREL, Professor of Audiology and Speech Sciences.
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 Philosophy

Associate Professor and Acting Head
HOWARD JACKSON, B.S. (Illinois), Ph.D. (Calif., Berkeley).

Professors
SAMUEL C. COVAL, M.A. (Manitoba), Ph.D. (North Carolina), D. Phil. (Oxon.).
JAMES DYBIKOWSKI, A.B. (Amherst), Ph.D. (London).
THOMAS E. PATTON, B.A. (Oberlin), M.A., Ph.D. (Harvard).
RICHARD I. SIKORA, A.B. (Harvard), Ph.D. (Calif., Berkeley).

Associate Professors
EDWIN LEVY, B.S. (N. Carolina), A.M., Ph.D. (Indiana).
RICHARD E. ROBINSON, B.A. (Puget Sound), M.A. (Syracuse), Ph.D. (Calif., Berkeley).
STEVEN F. SAVITT, A.B. (Columbia College), Ph.D. (Brandeis).

Assistant Professors
J. PAUL RUSSELL, B.A. (Queen's), M.A. (Edinburgh), Ph.D. (Cantab.).
JOHN P. STEWART, B.S., M.S. (Pennsylvania).
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 Professors
RAYMOND D. BRADLEY, B.A., M.A. (Auckland), Ph.D. (Australian National).
PHILIP P. HANSON, B.A. (Calgary), M.A., Ph.D. (Princeton).
RAYMOND E. JENNINGS, B.A., M.A. (Queen's), Ph.D. (London).
LAWRENCE RESNICK, B.A., Ph.D (Cornell).
DAVID P. ZIMMERMAN, B.A., M.A., Ph.D. (Michigan).

Lecturers from other Departments
DANIEL L. OVERMYER, Professor of Asian Studies.
SHIRLEY D. SULLIVAN, Professor of Classics.
ROBERT B. TODD, Professor of Classics.

Department of Political Science

Professor and Acting Head
DONALD E. BLAKE, B.A., M.A. (Alberta), Ph.D. (Yale).

Professors
H. ALAN C. CAIRNS, M.A. (Toronto), D.Phil. (Oxon.), F.R.S.C.
DAVID J. ELKINS, B.A. (Yale), M.A., Ph.D. (Calif., Berkeley).
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., Berkeley).
RICHARD G. C. JOHNSTON, B.A. (Brit. Col.), M.A., Ph.D. (Stanford).
JEAN A. LAPONCE, Dipl.I.E.P. (Paris), Ph.D. (Calif., Los Angeles), F.R.S.C.
MICHAEL D. WALLACE, B.A., M.A. (McGill), Ph.D. (Michigan).
MARK W. ZACHER, B.A. (Yale), M.A., Ph.D. (Columbia).

Associate Professors
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).

BRIAN L. JOB, B.A., M.A. (Alberta), Ph.D. (Indiana).
PAUL J. MARANTZ, B.A. (Cornell), M.A., Ph.D. (Harvard).
DIANE K. MAUZY, B.A., M.A. (San José), Ph.D. (Brit. Col.).
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 Professors
LONNY E. CARLILE, B.A. (Hawaii), M.A. (Kyushu), Ph.D. (Calif., Berkeley).
HEATH B. CHAMBERLAIN, B.A. (Princeton), M.A., Ph.D. (Stanford).
GEORGE HOBERG, JR., B.S. (Calif., Berkeley), Ph.D. (Massachusetts Institute of Technology).
SAMUEL V. LASELVA, B.A., M.A. (Western Ontario), D.Phil. (Oxon.).

Department of Psychology

Professor and Head
RICHARD C. TEES, B.A. (McGill), Ph.D. (Chicago).

Professors
DAVID J. ALBERT, B.A. (Kansas), M.A., Ph.D. (McGill).
MICHAEL J. CHANDLER, B.A. (Grinnell), Ph.D. (Calif., Berkeley).
STANLEY COREN, A.B. (Pennsylvania), Ph.D. (Stanford).
KENNETH D. CRAIG, B.A. (Sir George Williams), M.A. (Brit. Col.), Ph.D. (Purdue).
DONALD G. DUTTON, M.A., Ph.D. (Toronto).
A. RALPH HAKSTIAN, B.A. (Brit. Col.), M.A., Ph.D. (Colorado).
ROBERT D. HARE, M.A. (Alberta), Ph.D. (Western Ontario).
ROMUALD LAKOWSKI, M.A. (Glasgow), Ph.D. (Edinburgh).
ANTHONY G. PHILLIPS, M.A., Ph.D. (Western Ontario), F.R.S.C.
JOHN P. J. PINEL, M.A. (Calgary), Ph.D. (McGill).
STANLEY JACK RACHMAN, M.A. (Witwatersrand), Ph.D. (London), F.R.S.C.
JAMES A. RUSSELL, M.A., Ph.D. (Calif., Los Angeles).
JAMES H. STEIGER, B.A. (Cornell), M.S. (Oklahoma), Ph.D. (Purdue).
PETER SUEDFELD, B.A. (Queens College), M.A., Ph.D. (Princeton), F.R.S.C.
LAWRENCE M. WARD, A.B. (Harvard), Ph.D. (Duke).
JERRY WIGGINS, A.B. (American University, Washington, D.C.), Ph.D. (Indiana).
DONALD M. WILKIE, M.A., Ph.D. (Manitoba).
RODERICK WONG, B.A. (Brit. Col.), M.A. (Western Michigan), Ph.D. (Northwestern).
JOHN YUILLE, M.A., Ph.D. (Western Ontario).

Associate Professors
LYNN ALDEN, M.A., Ph.D. (Illinois, Champaign).
D. SUSAN BUTT, M.A. (Brit. Col.), Ph.D. (Chicago).
JENNIFER D. CAMPBELL, M.S., Ph.D. (Georgia).
MICHAEL W. CHAPMAN, B.A. (Calif., Santa Cruz), M.A., Ph.D. (Virginia).
RAYMOND S. CORTEEN, M.A., Ph.D. (Edinburgh).
ERIC EICH, B.A. (Maryland), Ph.D. (Toronto).
BORIS GORZALKA, B.Sc. (McGill), Ph.D. (Calif., Irvine).
WOLFGANG LINDEN, Diploma Psychology (Muenster), Ph.D. (McGill).
DEMETRIOS PAPAGEORGIS, A.B. (Hamilton), M.A., Ph.D. (Illinois).
DELROY L. PAULHUS, B.A. (Carleton), M.S., Ph.D. (Columbia).
LAWRENCE J. WALKER, B.A. (New Brunswick), Ph.D. (Toronto).
JANET WERKER, B.A. (Harvard), M.A., Ph.D. (Brit. Col.).
TANNIS MacBETH WILLIAMS, B.A. (Brit. Col.), M.S., Ph.D. (Purdue).

Assistant Professors
DARE A. BALDWIN, B.A. (Calif., Berkeley), M.Sc. (Calif., Santa Cruz), Ph.D. (Stanford).
REBECCA L. COLLINS, B.S. (Wisconsin, Madison), M.A., Ph.D. (Calif., Los Angeles).
ANITA DELONGIS, B.A., Ph.D. (Calif., Berkeley).
JAMES T. ENNS, B.A. (Winnipeg), M.A., Ph.D. (Princeton).
PETER GRAF, B.Sc. (Toronto), Ph.D. (McMaster).
GUY J. JOHNSON, M.A., Ph.D. (Texas).
CHARLOTTE JOHNSTON, B.A., M.Sc. (Calgary), Ph.D. (Florida).
DARRIN R. LEHMAN, B.A. (Calif., Santa Cruz), M.A., Ph.D. (Michigan).
FRED P. VALLE, A.B. (Calif., Riverside), Ph.D. (Michigan).

NSERC University Research Fellow
CATHERINE RANKIN, B.A., M.A. (Guelph), B.Ed. (Western Ontario), Ph.D. (City University of New York).

Department of Religious Studies

Head
To be appointed.

Professor
HANNA E. KASSIS, B.A. (American University of Beirut), Ph.D. (Harvard).

Associate Professors
CHARLES P. ANDERSON, A.B. (Willamette), M.Div. (Union Theological Seminary), Ph.D. (Columbia).
SHOTARO IIDA, M.A. (Tohoku), Ph.D. (Wisconsin).
PAUL G. MOSCA, B.A. (Fordham), A.M. (Harvard), Ph.D. (Harvard).

Assistant Professor
RICHARD MENKIS, B.A. (Toronto), M.A. (Toronto), M.A. (Brandeis).

Lecturers from other Departments
ASHOK AKLUJKAR, Professor of Asian Studies.
MARY MOREHART, Associate Professor of Fine Arts.
DANIEL L. OVERMYER, Professor of Asian Studies.
I. MARC PESSIN, Senior Instructor of Fine Arts.

Department of Slavonic Studies

Acting Head
KLAUS PETERSEN, Staatsexamen (Hamburg), Ph.D. (Brit. Col.), Professor of Germanic Studies.

Professors
BOGDAN CZAYKOWSKI, B.A. (Dublin), M.A. (London).
MICHAEL H. FUTRELL, B.A., Ph.D. (London).
BARBARA HELDT, B.A. (Wellesley College), M.A. (Columbia), Ph.D. (Chicago).

Associate Professors
PETER PETRO, M.A. (Brit. Col.), Ph.D. (Alberta).
NICHOLAS POPPE, B.A. (London), Ph.D. (Indiana).
CHRISTOPHER J. G. TURNER, M.A., M.Phil. (Oxon.), M.A., Ph.D. (Cantab.).

Assistant Professor
IRINA M. REID, M.A. (Brit. Col.), L.R.S.M., A.R.T.C.

Senior Instructor
IRINA REBRIN, B.A. (Fu Jen).

Department of Theatre

Professor and Head
ERROL DURBACH, M.A. (Rhodes), M.A. (Cantab.), Ph.D. (London).

Associate Professors
JOHN BROCKINGTON, B.A. (Brit. Col.), D.F.A. (Yale).
RAYMOND J. HALL
PETER LOEFFLER, D.Phil. (Basel, Switzerland).
CHARLES SIEGEL, B.A. (Brandeis), M.F.A. (Yale).
KLAUS G. STRASSMANN, Ph.D. (Stanford).
ARNE ZASLOVE, Diploma (Ecole Jacques Lecoq).

Assistant Professors
CHRIS GALLAGHER, B.F.A. (Brit. Col.).
ROBERT GARDINER, B.A. (California State, Sacramento), M.F.A. (Washington).
MARA GOTTLER, M.A. (Windsor).
STEPHEN MALLOY, B.A. (Ottawa).
BRIAN McILROY, B.A. (Sheffield), M.A. (Leeds).
ROD MENZIES, M.F.A. (York).
JOHN S. NEWTON, M.A. (Berkeley, San Francisco State).
JOHN WRIGHT, B.A. (Brit. Col.), M.A. (Stanford).
M. NORMAN YOUNG, B.A. (Brit. Col.).

Senior Instructor
IAN C. PRATT, Technical Director.

Adjunct Professor
PHILIP KEATLEY, B.A. (Brit. Col.).

See separate alphabetical listings for the following Schools of the Faculty of Arts:

Family and Nutritional Sciences
Library, Archival and Information Studies
Music
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 Science in Dietetics (B.Sc.(Dietet.))

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, Applied Creative Non-fiction, 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; Music; and Social Work.

For information about the M.A., M.F.A., M.Mus., M.S.W., Ph.D., and D.M.A. degrees, see the Faculty of Graduate Studies section of the Calendar.

Admission

For admission requirements see section on Admission in the General Information section of the Calendar.

The Faculty of Arts, while assigning advanced placement in some cases, does not assign advanced credit for courses in the I.B. or A.P. programs.

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. and B.F.A. 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, 1866 Main Mall, Vancouver, B.C. V6T 1W5.

Programs of Study

The following 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 under Creative Writing, Fine Arts, and Theatre. Students in any other degree program in the Faculty should consult the description 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 three programs of study: a **Major program,** which consists of a further 30 units of work (making a total for the degree of 60 units); an **Honours program,** which consists of a further 36 units of work (making a total for the degree of 66 units); or the **General B.A. program**, which consists of a further 30 units of work (making a total for the degree of 60 units). If a Major or the General program is chosen, 15 units of work are required in each of the last two years; if the student is admitted to an Honours program, 18 units of work are required in each of the last two years.

Students should note that the General B.A. program has certain admission requirements and that Major and Honours programs in most fields require that certain prerequisite courses be taken in the first and 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; no record of the dropped course will appear on the student's transcript. A student may also withdraw from a one-term course up to the end of the sixth week, and from a two-term course up to the end of the twelfth week; the withdrawal will be recorded on the transcript by a standing of "W" and will not be included in computing averages.

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 and Summer Sessions with that obtained in Winter Sessions.

A student must have the permission of the Senior Faculty Adviser to register for more than 15 units of work in a Winter Session, unless enrolled in a program for which the *Calendar* requires more than 15 units of work in the session. 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 B.A. degree 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.

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 in a course may be excluded from its final examination. Students who are unavoidably absent because of illness or disability should report to their instructors on their return to classes.

Inability to Complete Requirements

A student who is unable to complete assigned work before the end of the session or to write final examinations because of extenuating circumstances such as illness or family bereavement should explain the circumstances in writing as soon as possible to the Senior Faculty Adviser. 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 in a Winter Session 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%.
Unit credit is granted 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 in a session will be assigned unless a student meets the following conditions:

1. passes in 15 units, or all units attempted (if fewer); OR
2. if taking more than 6 units, passes in at least three-fifths of them and obtains an overall average of at least 60% in three-fifths of the units taken; OR
3. if taking 6 or fewer units, passes in at least one-half of them.

At any level of study, a student 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 written permission to register is obtained from the Dean.

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:

1. the student has written the final examination and earned a course grade of at least 40%, and
2. 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. A student who fails 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 advanced credit for English 100 or Arts One must pass the English Composition Test (see **English Composition Requirement,** below).

Transcript of Academic 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 any degree program in the Faculty, the student must satisfy certain preliminary, or general, requirements, as described below:

ENGLISH COMPOSITION REQUIREMENT

To qualify for the degree of B.A., B.F.A., B.H.E., B.Mus., B.Sc.(Dietet.), 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 are expected to pass the ECT before registering in the Faculty of Arts for their final 30 units. **Until a student has passed the Test, registration for any more than 45 units toward a degree in the Faculty will be blocked.**

Students (including students transferring from other institutions) who have obtained credit for English 100 or Arts One but have not passed the ECT will write it at the first available sitting in September. The Test will also be given during the December examination period, in late March, and in July.

Students writing the ECT for the first time may write it without charge if they are in one of the following categories:

1. students enrolled in English 100 writing their mid-course ECT;
2. transfer students who enter UBC in 1990 writing the September 1990 ECT.

All others must attach a "Fee Paid" sticker to their ECT answer booklet. The sticker is available for a fee of $10.00 from the Department of Financial Services.

Students who anticipate difficulty passing the ECT are advised to enrol in a remedial English course in the Centre for Continuing Education.

SCIENCE REQUIREMENT

To qualify for the B.A. or B.F.A. degree, a student must satisfactorily complete one of the following four requirements:

1. three units of work in the Faculty of Science (any course offered by the Department of Mathematics may apply); OR
2. Geography 101 or 330; OR
3. Human Nutrition 351 and 1½ units in a Science course as in (1.); OR
4. 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 343, 344, 345, 346, 446
Geology 310
Geophysics/Astronomy 310
Oceanography 310
Physics 140, 340

LITERATURE REQUIREMENT

To qualify for the B.A., B.F.A., or B.Mus. degree, 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 offered by another department of the Faculty, such as literature in translation, Women's Studies 224, or Theatre 220, *except that students taking either a B.F.A. or a B.A. in Theatre may not satisfy the literature requirement with Theatre 220.*

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, 401, 411; Italian Studies 310, 431; Spanish 220, 311, 312; Slavonic Studies 206, 306, 307, 308 *except that such literature in translation courses may not be offered to fulfil this requirement by those students who are majoring in the language.*

The following courses are also 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 300, 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; French 220 and all 400- level literature courses in French except 401, 420, 499; 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; 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.*

LANGUAGE REQUIREMENT

To qualify for the B.A. or B.F.A. degree, 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 entering the Faculty of Arts literate and competent (*i.e.* who can speak and write and who are acquainted with literature) in a language other than English may be permitted to satisfy the language requirement through examination where faculty expertise to test such competence and literacy is available. No unit of credit will be awarded for satisfaction of the language requirement through such examinations. **Students who have not satisfied this requirement** prior to registration in the Faculty of Arts must be registered in a course leading to its fulfilment in the initial and each subsequent registration in the Faculty until the requirement is met. (Students taking Honours in Mathematics are referred to the Faculty of Science, as there are special requirements.)

Students intending to obtain a **General B.A. degree** must satisfy the language requirement prior to enrolling in the last 30 units of the General B.A. program.

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

Students will choose:

Required Courses

1. English 100 or Arts One;
2. Language, if the requirement is not yet satisfied.

Electives

Additional courses including, normally, the science requirement, chosen 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.

Anthropology 100(3), 201(1½/3), 202(1½/3), 203(1½), 204(1½), 205(1½), 206(3), 217(1½), 240(1½).
Arts One (9).
Asian Languages 300(3).
Asian Studies 105(3), 115(3), 206(3).
Biology 101(3) or 102(3)* or 103(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 100(1½), 118(1½)*, 124(1½)*, 126(1½)*.
Creative Writing 202(3)*, 301(3)*.
Czech/Slovak 325(3).
Economics 100(3).
English 100(3).
Family Science 200(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), 120(3), 190(1½), 220(1½), 260(1½).
Geology 105(3).
Geophysics 120(1½)*.
German 100(3), 104(6), 110(3)*, 210(3)*.
Germanic Studies 302(3).
Greek 100(3), 125(3).
Hebrew 305(3).
Hindi 102(3), 110(3).
History 101(3), 115(3), 120(3), 122(3), 125(3), 135(3), 170(3), 171(3), 205(1½).
Indonesian 102(3).
Italian 100(3), 101(3), 105(6), 200(3)*.
Japanese 100(3), 101(3)*, 102(3), 103(3), 180(6).
Korean 102(3).
Latin 100(3), 120(3)*.
Linguistics 100(3).
Mathematics 100/(1/½), 101(1½)*, 111(3), 120(1½)*, 121(1½)*, 130(3), 140(1½), 141(1½)*.
Music 103(1½), 104(1½), 106(1½/3), 120(1½), 121(1½), 135(1), 150-157(1), 159-165(1).
Philosophy 100(3), 102(1½), 103(1½), 115(3), 210(3).
Physics 110(3)*, 115(3)*, 120(3)*, 140(3).
Polish 110(3).
Portuguese 102(3).
Psychology 100(3).
Punjabi 102(3).
Religious Studies 100(3) 202(3), 204(3).
Russian 100(3), 110(6), 325(3).
Sanskrit 102(3).
Slavonic Studies 105(3) 110(1½), 206(1½/3).
Sociology 100(3), 201(1½/3).
Spanish 100(3) 105(6), 110(3)*, 200(3)*, 205(3)*, 211(3).
Theatre 120(3), 150(3), 160(3).
Ukrainian 325(3).

COURSE SELECTION: SECOND YEAR

Students will choose:

A language other than English if the language requirement is not yet satisfied. (Language courses in List A may be taken in the second year.)

English at the 200-level or another course satisfying the 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, although three units of senior course work may be included which will form part of the student's program (see **Beginning the Major, Double Major or Honours Program in the Second Year** below).

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), 215(1½/3), 220(1½), 221(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), 204(1½), 205(1½), 206(3), 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), 254(3), 303(1½), 306(1½), 312(3), 313(1½), 317(1½), 319(3), 320(1½), 325(1½), 326(1½), 334(3), 336(3), 341(1½), 342(1½), 343(1½), 344(1½), 345(3), 350(3), 355(1½), 360(1½), 361(1½), 365(1½), 367(1½), 370(1½), 371(1½), 374(1½), 384(1½), 387(1½).
English 201(3), 202(3), 203(3), 204(1½), 205(1½), 206(1½), 207(1½), 208(3), 210(3), 211(3), 303(3), 329(3).
Family Science 314(1½).
Fine Arts 225(1½), 226(1½), 251(1½), 261(1½), 281-290(1½).
French 202(3), 215(3), 220(3), 340(3), 341(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), 204(6), 210(3), 310(3).
Germanic Studies 201(1½/3), 301(3), 303(1½/3), 401(1½/3), 411(1½/3), 412(3).
Greek 200(3).
Hebrew 405(3).
Hindi 200(3).
History 201(3), 202(3), 203(3), 207(1½), 208(1½), 237(3), 270(3), 271(3), 273(3).
Human Nutrition 209(1½).
Indonesian 200(3).
Italian 200(3), 201(3).
Italian Studies 310(3).
Japanese 200(3), 201(3), 280(6).
Korean 200(3).
Latin 200(3), 205(6).
Linguistics 200(3).
Mathematics 200(1½), 201(1½), 205(1½), 220(1½), 221(1½), 223(1½), 224(1½), 226(3), 227(1½), 302(1½), 315(1½).
Medieval Studies 200(3).
Microbiology 200(3).
Music 203(1½), 204(1½), 220(1½), 221(1½), 225(1½), 235(1), 321(1½/3), 324(1½), 325(1½), 326(1½/3), 345(1½).
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).
Punjabi 200(3).
Religious Studies 205(3).
Russian 200(3), 215(1½), 425(3).
Sanskrit 200(3).
Slavonic Studies 306(3), 307(1½/3), 308(1½/3), 310(1½/3), 340(3).
Sociology 200(3), 210(3), 213(1½/3), 214(1½/3), 215(3), 220(3), 230(3), 240(1½/3), 250(1½/3), 260(1½/3).
Soil Science 300(1½).
Spanish 200(3), 205(3), 211(3), 220(3), 311(3).
Statistics 200(1½), 203(1½), 205(1½), 302(1½).
Theatre 220(3), 230(3), 233(1½), 250(3), 251(3), 260(3), 261(3), 262(3), 345(3), 363(1½).
Ukrainian 425(3).
Urban Studies 200(3).
Women's Studies 222(3), 224(3).

PROGRAM REQUIREMENTS

By the beginning of the third year, a student must enter one of the following programs:

Honours Program: This program involves intense specialization in a single field or area of interdisciplinary study. It is a preferred route to graduate study and requires maintenance of high academic standing and, usually, preparation of a graduating thesis.

Major Program: This program involves specialization in a single field or area of interdisciplinary study. It may lead to graduate study if sufficiently high standing is obtained.

Double Major Program: This program involves specialization in two fields or areas of interdisciplinary study. It is an ambitious program allowing a dual focus with few electives outside the Major subjects.

General Program: This program permits a student, in consultation with an assigned adviser, to select courses that will provide a broad liberal education, encompassing several disciplines with a limited concentration in one discipline. With careful planning and sufficiently high standing it may be possible to go on to graduate study, although additional qualifying courses may be necessary.

Enrolment in a Major or Honours Program

Students may enrol in a Major or Honours program when they:

1. have completed, or are registered in courses which complete, 30 units from lists A and B; and
2. have satisfied the English 100 or Arts One requirement; and
3. have completed the prerequisite(s) for the proposed program.

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:

1. complete at least 24 units of work in courses numbered 300 or above;
2. satisfy the **Major requirement** by completing at least 15 units of work in one subject or field of specialization, in courses numbered 300 or above; and

3. complete at least six 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.
2. Course in Major subject.
3. Elective course outside Major subject.
4. Elective.
5. Elective.

Fourth Year:

1. Course in Major subject.
2. Course in Major subject.
3. Course in Major subject.
4. Elective course outside Major subject.
5. Elective.

A student who, after obtaining the Bachelor of Arts degree, plans to enter the elementary or secondary teaching program of the Faculty of Education should consult the Education section of the Calendar and the Teacher Education Office of that Faculty (Room 103 in the Scarfe Building). Students should note that courses in the Faculty of Education are not normally available for credit toward a B.A. degree. (See below: **Courses in other Faculties or Degree Programs**.)

Double Major Program

Prerequisites:

Thirty units of first- and second-year credit including English 100 or Arts One, requirements in language, literature, and science, as well as prerequisites for two Majors in the Faculty of Arts.

Third and Fourth Year:

The unit requirement for each of the two Majors, plus three units of third- or fourth-year electives outside the subjects or fields of specialization.

Honours Program

Students contemplating an Honours program are advised to complete Faculty requirements before entering the program.

On entering an 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 will be granted the degree with first- or second-class Honours on completion of a total of 66 units of work approved by the candidate's department or, in the case of special programs, by the departments concerned and the Senior Faculty Adviser. A minimum average of second-class standing in the final 36 units of work is required.

In the last 36 units of the Honours program, a student must satisfactorily complete (a) *at least* six 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.

Beginning the Major, Double Major, or Honours Program in the Second Year

Several departments (e.g. Asian Studies, Fine Arts, Geography, Hispanic & Italian Studies, Philosophy, Slavonic Studies) and the School of Music permit qualified students to take three units of senior course work towards the Major or Honours degree in the first 30 units. A student who chooses to begin specialization in the second year must complete at least nine units of work in courses outside the field of the Major or Honours program in the final 30 or 36 units. Students in the Double Major program must complete six units of electives outside the subjects or fields of specialization (three of these must be at the third- or fourth-year level).

General Program

The purpose of the General B.A. program is to allow students to achieve a broad liberal education through a course of study that includes several disciplines with a limited concentration in one or more. A student who is interested in doing extremely focussed study in an area involving more than one discipline, or who wishes to do an Honours program in such an area, should consider the Special Major and Honours programs above. Students interested in areas of multi-disciplinary study where there are no Major or Honours degree programs (such as Canadian studies, native studies, ethnic studies, urban studies, etc.) may wish to approach these topics through the General B.A. program. Students who plan to enter the elementary or secondary teaching program of the Faculty of Education may wish to use the General B.A. program as a course of studies leading to teaching concentrations.

Admission

Students are normally admitted to the General B.A. program after completion of 30 units of course work for credit toward the B.A. degree. Applicants who have successfully completed between 30 and 45 units may be admitted to the program if they have obtained an overall average of at least 60% in all courses attempted. Students with more than 45 units of credit toward the B.A. degree will not be admitted to the General B.A. program.

To be accepted into the program, a student must have satisfied the Faculty of Arts Language Requirement and the English Composition Requirement (i.e. have credit for English 100 or Arts One and have passed the English Composition Test).

Students commencing third-year studies who intend to enrol in the General B.A. program must submit an application to the Board of Studies for the General B.A., preferably by August 15. Application forms are available in Room A207, Buchanan Building.

Requirements

All courses acceptable for credit toward the General B.A. degree have been classified into four categories:

1. Humanities
2. Social Sciences
3. Creative and Performing Arts
4. Sciences

The list of courses in each category may be obtained from the Board of Studies.

Within the last 30 units, students in the General B.A. program must complete:

1. at least 15 units of 300- or 400-level courses in one category including nine units (but no more than nine units) from one discipline and
2. at least six units of 300- or 400-level courses in one other category.

Courses selected must be acceptable for Major or Honours programs in the specific areas of concentration, so students intending to enter the General B.A. program should consider the prerequisites of advanced courses in areas of their interest. With the advice and consent of their assigned advisers, students may be allowed to enrol in up to six units of courses relevant to their program outside the Faculty of Arts (consistent with the restrictions under **Courses in Other Faculties or Degree Programs** below). For graduation, students in the General B.A. program must complete 60 acceptable units and also satisfy the Faculty of Arts Language, Literature, Science, and English Composition requirements.

Admission and Program Approval

Upon application for the General B.A. program, students will be assigned a faculty adviser. Admission to the program usually requires an interview with the assigned adviser. After acceptance into the program, the student will prepare, in consultation with the adviser, a program of courses for the third and fourth years. That program of courses may only be altered with the approval of the adviser. Before enroling for the last 15 units, the program of courses must be reviewed with the assigned adviser, revised if appropriate, and approved.

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

The following courses in other faculties or degree programs are accepted for credit toward the B.A. degree:

1. All courses designated FMSC in the **Family Science** program of the School of Family and Nutritional Sciences.
2. **History of Medicine** 400 and 401 (prerequisites: Biology 101 or 102).
3. All courses in the history, theory and composition of **Music;** a maximum of three units from the ensemble courses in musical performance (Music 150-165). No other musical performance courses will be allowed (but see special conditions for the B.A. in Music).
4. All courses in the **Faculty of Science,** subject to the limitation described below regarding credit for special introductory courses.

A maximum of six 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 B.A. degree:

Biology 343: Plants and Man
Biology 344: Human Heredity and Evolution
Biology 345: Ecology and Man
Biology 346: Microbes and Man
Biology 446: Principles and History of Biology
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
Human Nutrition 303: World Problems in Nutrition
Human Nutrition 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

In certain Major and Honours programs leading to the Bachelor of Arts degree, students may take up to six units in courses offered by other faculties or schools if the department in which they are registered 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 specialization). Students in the General B.A. program may also be allowed, with the advice and consent of their assigned adviser, to take up to six units in courses offered by other faculties or schools if their assigned adviser agrees to accept such courses as part of their 15-unit or 6-unit General-program category concentrations. Qualified fourth-year students may be allowed to register in up to three units of courses in the Faculty of Arts at the 500 level toward completion of a Major or Honours degree program. Whenever such permission is granted, the department or General B.A. adviser must notify the Senior Faculty Adviser in writing before the permission takes effect.

With the above exceptions, no course in another faculty or degree program is accepted for credit toward the B.A. degree.

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; Music; 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 Major or Honours degree program 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. Students in the General B.A. program interested in these multidisciplinary thematic areas may wish to use the entries in planning their program of studies.

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 B.A. degree:

Major

Second Year:
Anthropology 200.

Third and Fourth Years:
Fifteen units in Anthropology and Sociology, including:
Anthropology 300
Three units from among Anthropology 400, 460, 470
Three units from among Anthropology 302-304, 350-353, 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:
Eighteen units in Anthropology and Sociology, including:
Anthropology 300
Three units from among Anthropology 400, 460, 470
Anthropology 449
Three units from among Anthropology 302-304, 350-353, 401-405. 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:

Anthropology 100, 200, 201, 202, 203, 204, 205, 206, 213, 214, 215, 217, 220, 221, 240, 301, 315, 320, 321, 322, 323, 325, 329 are general courses open to all students. Anthropology 301, 321, 322, 323 cannot be taken for Major or Honours credit.

Other courses listed in **Courses of Instruction** under "Anthropology" are intended primarily for students in the Major and Honours programs. Except for 300 and 449 these are open to non-majors and students in the General B.A. Program with appropriate prerequisites.

Anthropology 200 is a prerequisite to all courses in the Department except those described above as "general", unless specific permission of a departmental adviser 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: Indians of British Columbia: Cultures and Resources
Anthropology 221: Indians of British Columbia: Art, Myth, and Ceremonies
Anthropology 301: Contemporary Indians of British Columbia
Anthropology 304: Ethnography of the Northwest Coast
Anthropology 321: The Canadian Far West in Prehistory
Anthropology 329: Native Peoples of Canada
Anthropology 401: Indians of North America
Anthropology 411: Prehistory of a Special Area in the New World
Anthropology 420: 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; three units from among Anthropology 400, 460, 470; Anthropology 304 or 401; six or more units from among Anthropology 304, 329, 331, 401, 411, 420 and 431.

Each May the Department issues a 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, a 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, the economic patterns of hunters and gatherers and agriculturalists, and the nature of complex societies. Instruction covers field techniques, analysis, and the study of various culture areas (such as Western North America, Mesoamerica, 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. Field experience is acquired through a summer practicum on a Classical site in Europe. 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 Geological Sciences** offers several courses that may prove of value to the student of archaeology, particularly in the fields of mineralogy and the analysis of materials.

The **Department of History** offers various courses on cultural history relevant to those working in archaeology. The Department also offers an introductory course in historical archaeology which concentrates on material culture in the period of written records, with an emphasis on North America.

The **Department of Religious Studies** offers courses at the undergraduate level in the archaeology of the ancient Near East (including Egypt), Biblical archaeology, and Islamic art and archaeology.

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 (also listed as Classical Studies 204)
Anthropology 205: Introduction to Historical Archaeology (also listed as History 205)
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 323: Archaeological Foundations of New World Civilizations
Anthropology 406: Analytical Techniques in Archaeology
Anthropology 410: Prehistory of a Special Area in Asia or Oceania
Anthropology 411: Prehistory of a Special Area in the New World
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 (also listed as Anthropology 204)
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: Topography and Monuments of Ancient Athens
Classical Studies 431: Topography and Monuments of Ancient Rome
Classical Studies 440: Summer Practicum in Classical Archaeology
Classical Studies 501: Topography and Monuments of Athens
Classical Studies 502: Topography and Monuments of Rome
Classical Studies 503: Studies in Greek Architecture
Classical Studies 504: Studies in Roman Architecture
Classical Studies 505: Studies in Greek Town Planning
Classical Studies 506: Studies in Roman Town Planning
Classical Studies 507: Studies in Greek Painting
Classical Studies 508: Studies in Roman Painting and Mosaics
Classical Studies 509: Studies in Greek Sculpture
Classical Studies 510: Studies in Roman Sculpture
Classical Studies 511: Studies in Greek Regional Archaeology
Classical Studies 512: Studies in Roman Provincial Archaeology
Classical Studies 513: The Archaeology of Greek and Roman Technology
Classical Studies 514: Greek and Roman Minor Arts
Classical Studies 515: Directed Studies in Classical Archaeology

History 205: Introduction to Historical Archaeology

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, 102 or 103: Principles of Biology
Biology 204: Comparative Vertebrate Zoology
Biology 205: Comparative Invertebrate Zoology
Biology 209: Non-Vascular plants
Biology 210: Vascular Plants
Biology 324: Introduction to Seed Plant Taxonomy
Biology 343: Plants and Man
Biology 412: Phytogeography
Biology 421: Paleobotany
Biology 422: 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 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 207: Geography of Ecosystems
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: Geographic Data Analysis
Geography 372: Cartography
Geography 373: Air Photograph Analysis
Geography 418: Environmental Change
Geography 473: Remote Sensing in Geographical Inquiry
Geography 495: Selected Latin American Habitats

Geology 105: Physical and Historical Geology
Geology 200: Mineralogy I
Geology 201: Mineralogy II
Geology 206: Stratigraphy
Geology 226: Sedimentology
Geology 256: Stratigraphy and Sedimentology
Geology 302: Igneous Petrology
Geology 312: Environmental Geology
Geology 321: Paleontology I
Geology 421: Paleontology II

ARTS ONE

Students entering the first year may enrol in Arts One, a 9-unit program of liberal education. Arts One is organized in teaching groups, each consisting of a maximum of 120 students and six 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, and individual conferences. 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.

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). Registration for Arts One is accomplished in the same way as registration in other courses in the Faculty of Arts.

ASIAN AREA STUDIES—see Asian Studies

ASIAN STUDIES

The Department of Asian Studies offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

The courses offered at the undergraduate level fall into two categories:

1. 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
2. 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 (1) are open to all students in the Faculty of Arts. Courses in category (2) are 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. However, in the more elementary courses, language training at the appropriate level is also provided for those who wish to obtain some knowledge of Chinese, Indonesian, Japanese, Korean, or South Asian languages (Hindi, Punjabi, Sanskrit, Urdu) as part of their general education or with a view to later practical use.

The Department offers Honours and Major programs in Chinese, Japanese, and South Asian Langages, and, in cooperation with other departments, a Major program in Asian Area Studies which requires less language study.

Study of the necessary languages should begin as early as possible in a student's academic career. A good foundation in language studies is a prerequisite for admission to graduate studies. Those who do not have the necessary preparation when they apply will be asked to make up this deficiency. Credit is not normally given to graduate students for such preparatory work.

Requirements for the B.A. degree:

Major in Asian Area Studies

Area of specialization:

Each Asian Area Studies major should choose a regional specialization within Asia: East Asia, South Asia, or Southeast Asia. Within the East Asia specialization, three sub-specializations are possible: China, Japan, and Korea.

Students who intend to do graduate work specializing in the Asian field are encouraged to take at least nine units in a single discipline (e.g., History, Political Science, Geography, Anthropology).

First and Second Years:

Students anticipating a major in Asian Area Studies must complete the following nine units of prerequisites:

1. a three-unit introduction to the civilization of the area of specialization (Asian Studies 105 for East Asia, Asian Studies 115 for South Asia; Asian Studies 206 for Southeast Asia).
2. six units of instruction in one of the languages of the area (Chinese, Japanese, or Korean for East Asia; Hindi, Punjabi, or Sanskrit for South Asia; Indonesian for Southeast Asia).

While students are urged to take the six units of language during the first two years, upper-year credit will still be given if they take it later; that is, Asian Area Studies majors may take 100- and 200-level Asian language courses as part of their required 24 units of upper-level Arts courses.

Students having no prior background in the language must take one of the following sequences:

Chinese 100 and 101, or Chinese 180
Hindi 102 and 200, or Hindi 110 plus 3 units from among: Hindi 405, Hindi 410, Urdu 401
Indonesian 102 and 200
Japanese 100 and 101, or Japanese 102 and 103 (001), or Japanese 103 (002) and either 200 or 201, or Japanese 180
Korean 102 and 200
Punjabi 102 and 200
Sanskrit 102 and 200.

Students having prior background in an Asian language may be required to take six units of upper-level work in the language.

First- and second-year students are also encouraged to take other relevant 100- and 200-level courses such as: Anthropology 100, Economics 100, Fine Arts 251, History 125, 270, Political Science 280, Religious Studies 204.

Third and Fourth Years

The major in Asian Area Studies requires fifteen units of upper-level (300- and 400-level) courses in the third and fourth years. These fifteen units should be in courses related to the area of specialization: East Asia, South Asia, or Southeast Asia. Lists of courses approved for each area are given below, divided into the following three categories:

1. humanities (art, language at the advanced level, literature, music, philosophy, religion);
2. history
3. social sciences (anthropology, economics, geography, political science, sociology).

Students must take at least three units from each category.

East Asia, Humanities:

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 367 (1½)
Religious Studies 431 (1½)
Theatre 340 (3)*

East Asia, History:

Asian Studies 320 (3) (= History 382)
Asian Studies 321 (3)(= History 381)
Asian Studies 322 (3)
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)

East Asia, Social Sciences:

Anthropology 315 (1½/3)
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)
Economics 344 (1½)
Geography 380 (1½)
Geography 385 (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 part of the (East) Asian Area Studies Major program.

South Asia, Humanities:

Asian Studies 345 (3)
Asian Studies 347 (3)
Asian Studies 350 (3)
Asian Studies 355 (3)
Asian Studies 360 (3)
Asian Studies 370 (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)

South Asia, History:
Asian Studies 340 (3)
Asian Studies 420 (3)
Asian Studies 438 (1½)
History 385 (3) (= Asian Studies 385)
History 387 (1½)
History 388 (1½)

South Asia, Social Sciences:
Anthropology 302 (1½)
Anthropology 403-5 (1½/3) (by permission)*
Asian Studies 450 (3)
Geography 380 (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.

Southeast Asia, Humanities:
Asian Studies 362 (3)
Asian Studies 450 (3)
Fine Arts 355 (3)
Fine Arts 356 (3)

Southeast Asia, History:
History 434 (3) (= Asian Studies 434)
(In years when this course is not offered, another course from the Southeast Asia Humanities list may be substituted.)

Southeast Asia, Social Sciences:
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 380 (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 six units must be outside the Asian field.

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 or 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 or above.

Major in Japanese
First and Second Years:
Japanese 100 and 101, or 102 and 103, and 200 and 201. Asian Studies 105 and 225 are 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 Japanese courses numbered 300 or above, including at least one 400-level course.
3-6 units in Asian Studies courses on Japan numbered 300 or 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.

Major in South Asian Languages
First and Second Years:
A total of nine units in lower level (100-200) South Asian language courses, including six units in one language from among Hindi, Punjabi, and Sanskrit, and three units in another. (Hindi 102 and 110 may not both be taken.) Asian Studies 115 is recommended. (Students with previous knowledge of any of the three languages must consult a Department adviser for placement.)
Third and Fourth Years:
9-12 units in South Asian language courses, including six units in one language from among Hindi, Punjabi, and Sanskrit, and three units in another. At least six of these units must be in courses numbered 300 or above.
3-6 units in Asian Studies courses on South Asia numbered 300 or above.
A total of at least 15 units is required for a Major.

Honours in Chinese (Japanese)
First and Second Years:
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 Major or Honours programs 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: 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.
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 380: Introduction to the Geography of Monsoon Asia.
Geography 385: Geography of China.
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.
Religions Studies 364: Buddhism in India and East Asia.
Religious Studies 431: The Buddhist Religious 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 Department.

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 and Dr. Sherrill E. Grace (Department of English), tel. 228-4069.

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.
Family Science 320, 322, 440.
Fine Arts 343, 348, 369, 443.
French 335, 403, 416, 419, 421.
Geography
Mainly Canadian content: 190, 317, 327, 328, 427, 450, 491, 497, 499.
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.
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.

A knowledge of the Greek or Latin language is not required for any course 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 may be credited toward a Major in Philosophy.

Requirements for the B.A. degree:

Major in Classical Studies

Second Year:
Classical Studies 310 or 330 or 331.

Third and Fourth Years:
Fifteen 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, 430, and 431; 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 six of the 15 units of Classical Studies. Religious Studies 300 and Philosophy 333 and 343 are accepted within the Classical Studies 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 B.A. degree:

Major in Classical Studies: see CLASSICAL STUDIES.

Major in Greek
Classical Studies 331 (preferably in the second year).
Fifteen units of Greek numbered above 300; for three 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).
Fifteen units of Latin numbered above 300; for three of these, a course in Greek or in Classical Studies numbered above 300 may be substituted.

Honours in Classics
Prerequisites or co-requisites: Greek 200, Greek 301, Latin 200, Latin 301, Classical Studies 331. Latin 205 may be taken in place of Latin 200 and Latin 301.

Third and Fourth Years:
Thirty 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

The Program in Comparative Literature offers opportunities for interdisciplinary study at the graduate level, leading to the M.A. and Ph.D. degrees. Undergraduates who are interested in preparing for the degrees should acquire competence in at least two languages other than their native language. In addition, comprehensive knowledge of at least one, and preferably two, literatures should be acquired through study in a double Major program or through the Honours program of one of the language departments. While retaining a primary focus in the study of literary texts, the Program also encourages study of interrelationships among literature, the arts and the social sciences. Students interested in Comparative Literature should consult Professor Lorraine Weir, Chairman (Buchanan E170), for further information and should obtain from the Program's main office (Buchanan E162) a copy of the *Handbook for Graduate Students in Comparative Literature* which provides details of the Program's entrance requirements and degrees.

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 B.F.A. degree:

First and Second Year:
Creative Writing 202 or 301 and the requirements for the first two years of the B.A. program.

Subsequent Years:
Students must complete 30 units, 18 of which are in Creative Writing courses. Students may select three 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 (In satisfying the program's three-genre requirement, 408 and 409 are treated as a single genre: fiction.)
   Creative Writing 403: Writing of Children's Literature
   Creative Writing 404: Radio Plays and Features
   Creative Writing 405: Creative Forms and Techniques of Non-fiction
   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
   Creative Writing 416: Applied Creative Non-fiction
   Creative Writing 439: Special Projects in Creative Writing
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 and Features
   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 and the B.F.A. program

Students from any faculty may apply for any course by submitting a sample of original creative writing, 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 and submission of a manuscript of 15-20 pages.

Students wishing to take the B.F.A. degree 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 creative writing manuscripts. Applicants will normally be accepted for the program on the recommendation of their Creative Writing 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 the B.F.A. program 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 specialization in Creative Writing should submit 20-25 pages of original writing relevant to that course. Applicants for Creative Writing interested in 404, 406, or 407 may submit fiction or plays.

First-year students are not eligible to take a 400-level course.

Double Major

Students who have completed all the degree requirements for a Double Major in Creative Writing and another subject falling within the B.A. program may choose to graduate with either a B.F.A. or B.A. degree.

Diploma in Applied Creative Non-fiction

Prerequisite: a Bachelor's degree or equivalent, or, in the case of mature applicants with considerable professional experience, extensive work in the field of Creative Non-fiction. Candidates for admission must submit at least

30 pages of original material containing samples of writing in Creative Non-fiction and at least one other imaginative form (fiction, poetry, playwriting, etc.).

Course of Study: The program consists of 12 units of work:
Creative Writing 301, or a 400-level workshop in another form
Creative Writing 405
Creative Writing 416
Creative Writing 439 or 492.

Notes:
1. 301 or the 400-level workshop in another creative form should be taken in the same year as 405. In Creative Writing 439 or 492, Diploma students undertake to complete a series of longer, interconnected, or book-length projects begun in Creative Writing 416.
2. All requirements for the Diploma must be completed within five years of the initial registration in the program.

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.

ECONOMICS

The Department of Economics offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Admission to the Major or Honours Program

Admission to the Major or Honours program in Economics is not automatic. To be admitted students must submit a formal application. Because there are a limited number of places some students who satisfy the minimum prerequisites may not be admitted.

Selection for admission is based on the average standing in all units of post-secondary coursework attempted, with the exception of six units which may be excluded from the calculation. The average is calculated on at least 24 units, including English 100, Economics 100, Mathematics 140 and 141 (or equivalent). Students not admitted to the Major in Economics who are eligible to take Economics 490 may be admitted to the fourth year of the program, but only if places become available, which is unlikely.

Students who are considering a Major or Honours program in Economics are strongly encouraged to seek advice on their program from Department advisers on completion of their first year.

Application

A written application for admission to the Major or Honours program should be received by June 15, prior to registering for the third year to ensure that the student will be considered for admission. Application forms are available from the Undergraduate Admissions Secretary, Department of Economics, The University of British Columbia, #997-1873 East Mall, Vancouver, B.C., V6T 1W5.

The application form must be accompanied by a copy of the student's permanent record from UBC (unless application is post-marked May 20 or earlier) and official transcripts of the student's record from all other post-secondary educational institutions attended.

Requirements for the B.A. degree:

Major

Prerequisites:

To be admitted to the Major program a student must have obtained 27 units of credit applicable to a B.A. degree from this University, including credit for:
English 100
Mathematics 140 and 141, or 100 and 101
Economics 100
Economics 201 and 202, or 206 and 207, or 301 and 302.
Students without Economics 201 and 202 (or their equivalents) may be considered for admission.

Major Requirements:

Economics 303.
Economics 325 and 326.
One of: Economics 334, 336, 437.
Economics 490.
Another three units in Economics at the 400 level.
Another three units in Economics at the 300 or 400 level.
Mathematics 200 and 221 are recommended, but not required.
Students should note the prerequisites for senior courses and plan their programs accordingly. Particular attention should be paid to the prerequisites for Economics 490; Economics 325 and 326 (or their equivalents) must be successfully completed **before** the beginning of the student's final year.

Honours

Prerequisites:

To be admitted to the Honours program a student must have obtained 30 units of credit applicable to a B.A. degree from this University with an overall second-class standing or better, and have completed successfully:
English 100
Mathematics 140 and 141, or 100 and 101
Economics 100 with at least a second-class standing
Economics 206 and 306 with at least a second-class standing (or, with permission of the Honours adviser, Economics 201 and 202).
Students considering an Honours program in Economics should consult the Department's Honours adviser on completion of their second year (if possible, on completion of their first year). Students without Economics 206 and 306 (or their equivalents) may be considered for admission pending satisfactory completion of the required courses.

Honours Requirements:

Economics 325 and 326.
One of: Economics 334, 336, 437.
Economics 307 with at least a second-class standing.
Another three units in Economics at the 400 level.
Another three units in Economics at the 300 or 400 level.
Economics 495 and 499.
Mathematics 200 and 221 are strongly recommended.
To continue in the Honours program a student must attain at least a second-class average in all courses taken in Economics.

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.

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 or Arts One 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). The designation "(1½-6)" means that during their complete programs of study, students may take up to 6 units of work in any course so marked **if** the specific topic of that course changes from term to term.

Requirements for the B.A. degree:

Major

Second Year:

English 201 (or under special conditions 450 or 210: see *English Courses Offered* for details).

Third and Fourth Years:

Students 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 five areas, as follows:
   a) At least 1½ units in each of three areas chosen from areas 1-5.
   and
   b) At least 1½ units in each of two additional areas chosen from areas 1-9.
      1. Old and Middle English (includes Chaucer): 340; 341; 350s.
      2. Sixteenth Century (includes Shakespeare): 360s.
      3. Seventeenth Century (includes Milton): 370s excluding 373.
      4. Eighteenth Century: 380s and 373.

5. Nineteenth Century: 390s.
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; 451.
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 (three units each).
2. At least three units from the following list: 340, 341, 350, 351, 352, 353, 355.
3. At least six 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 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 3-unit courses.
1. Language: 320 (3); 322(1½); 324(1½); 325(1½); 326(1½); 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. Thirty-six units are required in the third and fourth years: at least 27 units in English courses and at most 30 units.

Suggested Courses for Intending Secondary School English Teachers

The English Department, in collaboration with the Faculty of Education, recommends the following courses for majors who wish to prepare themselves to teach English in secondary schools.

Second Year:
English 201 (Major Authors), and either
English 202 (Canadian Literature) or 203 (Biblical and Classical Backgrounds).

Third and Fourth Years: a total of 18 units, including
English 304 (Advanced Composition)
Three units of English Language (320-329, 340-341)
English 365 (Shakespeare)
English 420 (Canadian Literature) (if not 202)
Three units of Twentieth-Century British or American Literature (400-416, 430-438)

Also recommended are English 311 (Literature of the Bible) (if not 203), and English 330 (Practical Criticism).

Students in this program must complete all the normal area requirements of an English Major (B.A.), and should also consult the Calendar description of the English Concentration and Major in the Faculty of Education.

ETHNIC STUDIES

Ethnic Studies 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 ethnomusicology 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 follow a normal degree program in a single department. 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 Chair of the Committee is Dr. Martha Foschi (Department of Anthropology and Sociology) tel. 228-3396.

FAMILY SCIENCE

The School of Family and Nutritional Sciences offers students in the Faculty of Arts the Family Science Major, an academic program in social science leading to the B.A. degree.

Requirements for the B.A. degree:

Major

First and Second Years:
Family Science 200 and Statistics 203.

Third and Fourth Years:
Family Science 420 and Family Science 422.
At least 12 additional units of Family Science courses including:
at least one of: 320, 322, 324, 326, 436
at least one of: 312, 314, 316, 410, 414
at least one of: 338, 340, 342, 440, 442.

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.A. in Studio Arts, B.F.A., and the Diploma in Art History. These courses of study have one common goal: the development of critical approaches to visual art. They 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. The B.F.A. and M.F.A. degrees are offered in studio art; and for those intending to pursue a post-graduate program in secondary education, a B.A. in Studio Arts is available. Depending upon the purposes of the student and the nature of each 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 B.A. degree:

Major

First and Second Years:
Any six units in Fine Arts, of which at least three units must be in art history.

Third and Fourth Years:
Nine units of Fine Arts courses numbered 300 or above in one of the following three areas:
1. Western art and architecture
2. Indigenous art of the Americas, or
3. Asian art.

See the departmental art history brochure and consult with an adviser for courses in these areas.

Six additional units in Fine Arts courses numbered 300 or above which must include at least three units in indigenous art of the Americas or Asian art courses for students in Western art, or three 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 three units of fourth-year seminar courses in the minimum requirements for the Major. No more than three 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 six units in Fine Arts, of which three 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 three units in art history numbered 300 or above and the Honours Essay (Fine Arts 499) are required in addition, for a total of 21 units of Fine Arts courses 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 B.A. in Studio Arts degree:

This program is intended for, but not limited to, students contemplating a post-B.A. professional program in Education.

Major

First Year:
A minimum of six units in Fine Arts, including Fine Arts 181 and three units in art history.

Second Year:
Fine Arts 281 (1½ units) and 4½ units from Fine Arts 282-290. For admission to these courses, see note in the **Courses of Instruction** section of the Calendar.

Third and Fourth Years:
Admission to the Major requires a minimum second-class mark in all second-year studio art courses.
A minimum of 15 units in courses numbered 300 and above, including at least six units in art history and nine units in studio art courses. A maximum of six units in Art Education (ARTE) courses offered by the Faculty of Education may be substituted for Fine Arts studio art course requirements, and three additional Art Education (ARTE) units may be credited towards Faculty of Arts requirements. Potential Education students are also advised to choose nine units of electives in a single non-Fine Arts discipline (any prerequisites should have been taken in the second year), which should be chosen in anticipation of a second teaching area.

Requirements for the B.F.A. degree:

The program leading to the B.F.A. degree normally consists of four years of study. The first two years are the first two years 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 second year. The number of places available in the program is strictly limited, hence entry into the program is by selection.

Students from Community Colleges intending to enter the B.F.A. program should normally apply to the University at the end of their first year. However, transfer students may be accepted into the B.F.A. in the third year subject to the submission of transcripts showing the completion of courses equivalent to six units from Fine Arts 281-290 (including 281) with a minimum second-class mark in each, an assessment of a portfolio of works and, if possible, an interview. Arrangements for this should be made with the Department by March 31. In all cases, admission will depend upon the spaces available and is at the discretion of the faculty. Students who do not maintain a second-class average in the B.F.A. courses may not continue in the B.F.A. program.

A brochure concerning the B.F.A. program is available upon request from the Department of Fine Arts.

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 the first-year B.A. program, including Fine Arts 181 and three units of art history, with second-class standing in each.

Second Year:
Requirements of the second-year B.A. program, including Fine Arts 281 (1½ units) and 4½ units from Fine Arts 282-290, with a minimum second-class standing in each. For admission to these courses, see the note in the **Courses of Instruction** section of the Calendar.

Third Year:
At least 18 units in courses in the Faculty of Arts including Fine Arts 380 (three units), six units chosen from Fine Arts 381-385, and Fine Arts 339 or Fine Arts 340 (three units).

Fourth Year:
At least 18 units in courses in the Faculty of Arts including Fine Arts 480 (three units) and nine units chosen from Fine Arts 481-485.

At least 30 of the last 36 units for the B.F.A. degree in Fine Arts must be in courses numbered 300 or above.

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 numbered 300 or above. No more than three 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 three units of Pass standing may be credited toward 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 the Diploma in Translation.

Requirements for the B.A. degree:

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 in French with emphasis on Language:
First and Second Years:
French 120 (or equivalent), 202, 220 (French 220 may be taken in the third year with permission of the Department).
Third and Fourth Years:
French 352 and either 450 or 452, and
— at least six units in language courses numbered above 350, and
— three units in literature courses numbered 300, 407-425.

Major 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 352, and
— 12 units in courses numbered 300 or above (excluding 340-346, 400, 403), of which nine units must be from literature courses 300, 407-425.

Honours in French with emphasis on Language:
First and Second Years:
French 120 (or equivalent), 202, 220.
Third and Fourth Years:
18 units in language courses numbered above 350, including 352, and 450 or 452, and
— three units in literature courses numbered 300, 407-425 (French 300 highly recommended), and
— French 499.

Honours in French with emphasis on Literature:
First and Second Years:
French 120 (or equivalent), 202, 220.
Third and Fourth Years:
French 300, 352, 401, 450 or 452, and 499, and
— nine units, of which at least six must be from literature courses 407-425.

Notes:

French 202 or its equivalent is prerequisite to all French language courses numbered 350 or above. French 220 or its equivalent is prerequisite to all French literature courses numbered 300, 401 and above.

With the exception of 401, and provided prerequisites have been satisfied, courses numbered 300-478 may be taken in either the third or the fourth year.

Change of course numbers. Prior to 1987, the language courses in the above list carried the numbers indicated in parentheses: 340 (320), 342 (303), 344 (305), 346 (304), 352 (302), 354 (316), 356 (306), 450 (404), 452 (402), 460 and 462 and 464 (308), 470 (422), 472 and 473 and 475 (405), 478 (470), 499 (449).

Diploma in Translation

Prerequisites: A Bachelor's degree or equivalent, or, in the case of mature applicants with considerable professional experience, extensive work in the field of translation. A high level of proficiency is expected in both written and spoken English and French. Before applying to the University for admission, all candidates must pass the Department's Translation Proficiency Examination which includes précis-writing and translations. Further information on the Examination may be obtained by phoning 228-2879.

Admission: **Only after passing the Translation Proficiency Examination** should candidates apply to the Office of the Registrar, **preferably before August 1,** for admission in September.

Course of Study: The program consists of fifteen units of work, which may be completed in one year of full-time study. (Prior to 1987 the French courses in the Diploma in Translation carried the numbers indicated in parentheses.)

French 480 (3) *Comparative French and English Stylistics.*
French 482 (3) *Advanced Translation: French to English* (423).
French 484 (3) *Advanced Translation: English to French* (424).
French 482 and French 484 are to be taken concurrently.
French 486 (3) *Seminar in Advanced Translation* (427).
French 489 (3) *Translation Project* (429).

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.

GENERAL PROGRAM — see Program Requirements.

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 the B.Sc. and for the **Atmospheric Science** program, offered cooperatively by the Departments of Geography and Oceanography.

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 B.A. degree:

Major

First and Second Years:

At least three units from Geography 120, 220, and 260; and at least three units from Geography 101, 200, 205, and 207.

Notes:

1. Geography 110 and 190 are not required but are strongly recommended.
2. Students who take six units of 100- or 200-level Geography courses in their first year may take up to three units of 300-level Geography technique courses in their second year, provided they include Geography 370. These units will count towards the departmental requirement of three units of technique courses for the Major.
3. Students intending to major in Geography with an emphasis on environmental studies must take Geography 101, 200, 205, 207 and three units of Mathematics. Students intending to emphasize economic or urban geography are normally required to take three units of Mathematics.

Third and Fourth Years:

15 units of Geography courses numbered 300 or above, as follows:
4½ units from Geography 310, 320, 350
3 units from technique courses, including Geography 370 (see list below)
1½ units from regional courses (see list below)
6 units of other courses, of which at least three shall be at the 400 level.

Notes:

1. 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.
2. 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, including Geography 370 (see list below)
1½ units from regional courses (see list below)
Geography 345, 445, and 449.
6 units of other courses, of which at least three shall be at the 400 level.
See notes (1) and (2) under **Major: Third and Fourth Years.**

The Honours program in Geography differs from the Major 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 preregistration 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, 370-375, 471-473.
Regional Courses: 380, 385, 390, 394-395, 481, 483-484, 491, 493-495, 497, 499.
Cultural-Historical Courses: 320, 324, 327-329, 423-425, 427.
Courses on Economic Geography: 352, 360-363, 410, 461, 464, 467-468.
Environmental Courses: 310, 315, 317, 410, 415, 417-418, 423-424.
Urban Courses: 350-352, 357, 450, 453, 457, 464.
Pacific Rim Courses: 320, 380, 385, 395, 425, 468, 481, 483-484, 490-491, 494-495, 499.

Graduate Courses and Seminars:

First Year—500, 506, 510, 515, 520-522, 525-526, 530-534, 540-544, 547-548.
Second Year and above—560-561, 570-571, 573, 575, 600.
Readings and Theses—550, 555, 599, 699.

Note: The following courses have *Science credit:* Geography 101, 200, 204-205, 207, 300-303, 306, 308-309, 330, 401-403, 405-407, 449-500, 520-522, 525-526, 555, 560-561.

Several courses in Geography involve field expenses. Students should check with advisers.

GERMANIC STUDIES

The Department of Germanic Studies offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Requirements for the B.A. degree:

Major in German

First and Second Years:

Students choose one of the following sequences depending on their previous knowledge of the language:

— No previous knowledge:	German 100(3) and 204(6) or German 104(6) and 210(3) or German 100(3) and 200(3) with first-class standing.
— With German 11:	German 110(3) and 210(3) or German 204(6).
— With German 12:	German 210(3).

Notes:

1. A student with first-class standing in German 200 may be admitted to German 310.
2. Students with secondary-school German or German-language background will be required to take a placement test on the first day of classes.

Third and Fourth Years:

German 310 (if not taken in second year), 320, 350, 450, and three additional units of German courses 402-423.

Honours in German

First and Second Years:

As for Major.

Third and Fourth Years:

German 310 (if not taken in second year), 320, 339, 350, 439, 450 and three additional units of German courses 402-423. Students may submit a three-unit Honours essay (German 449) in place of 339 or any other three units of senior work, aside from required courses.
A course in European history with an emphasis on German-speaking countries. See Honours adviser.
One university-level course in a language other than English or German.

Notes:

1. Courses are offered in German and in Germanic Studies, the latter including an elementary and an intermediate course in Swedish.
2. Literature courses numbered 402 or 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.

HINDI—see Asian Studies: South Asian Languages.

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., B.A.

Requirements for the B.A. degree:

Italian

Students with Italian 11 or 12 should consult a Departmental adviser for placement in appropriate language courses.

Major

First and Second Years:

Italian 100, 200 or 101, 201 or 105.

Third and Fourth Years:

Fifteen units in Italian courses numbered 300 or above, excluding Italian 302 and Italian Studies 330, 431, and 432.

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.
Eighteen additional units in Italian courses numbered 300 or above, excluding Italian 302 and Italian Studies 330, 431, and 432.

Spanish and Portuguese

Students with a previous knowledge of Spanish should consult a departmental adviser for placement.

First and Second Years: Students take the courses in one of the columns below:

	A	B*	C	D*
Spanish	100	105	110	100
	200	300	205	200, 205
	220	220	220	220

*Students with Sequence B, or with first-class standing in Sequence D, proceed to Spanish 400.

Spanish 220 may be taken in the third year with the permission of a departmental adviser.

Also recommended: Spanish 211, Portuguese 102, 202, and for those wishing to specialize in language, Linguistics 100 or 200.

Third and Fourth Years:

Students wishing to specialize in Spanish may choose to concentrate either on literature or on language, although individual programs may also be approved. All programs have a common core of nine units:

three units of Spanish 300 or 400 and

six units of Survey of Literature courses: 335, 355, 363.

The **Major** requires a minimum of 15 units of courses in Spanish.

For the program in **Spanish, Portuguese, and Latin-American Literatures,** in addition to the core courses, six or more units are to be chosen from Spanish courses numbered above 400. At least 1½ units must be from the field not covered by the two surveys.

For the program in **Spanish with Emphasis on Language,** students take Spanish 400, the two survey courses of the core program, and six or more units from Spanish 403, Romance Studies 478 and courses in Spanish numbered above 400.

The **Honours** degree requires a minimum of 24 units of courses in Spanish:

For the programs in **Spanish, Portuguese, and Latin-American Literatures,** in addition to the core courses and Spanish 449 (Honours Essay), 12 or more units are to be chosen from Spanish courses numbered above 400. At least 1½ units must be from the field not covered by the two surveys.

For the program in **Spanish with Emphasis on Language,** students must take Spanish 400, the two survey courses of the core program, Spanish 403, Spanish 449 (Honours Essay), and nine or more units from Romance Studies 478 and courses in Spanish numbered above 400, including Spanish 407.

A reading knowledge of Latin, French, or another Romance language is strongly recommended for Honours students.

Recommended electives for the program in Literatures: Portuguese 307, History 350, 351, 450, 489.

Recommended electives for the program in Language: Portuguese 307, Spanish 444 (Catalan), Italian 300, Romance Studies 420, Linguistics 319, 420, 425, 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:

Twenty-four 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:

Twelve units from two languages: French 352, 452; Italian 300, 400; Spanish 300, 400.

Three units of a third Romance language: French 340, Italian 302, Spanish 305, Catalan (Spanish 444), Portuguese 307, Romanian (Romance Studies 420).

Three units of Romance Linguistics (Romance Studies 478, French 478 or Linguistics 320).

Six 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.

At least three, and up to six, units chosen from the following: Linguistics 319 (prerequisite: Linguistics 200), Latin 305; French 334, 335, 407-425, 450, 456, 460-464, 472-475; Italian 303, 304, 401-420; 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 B.A. degree:

Major

First and Second Years:

Six 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 (1) of literature in the various departments of language, (2) of thought in the departments of Philosophy, Religious Studies, and Political Science, and (3) of the arts in the departments of Fine Arts, Music, and Theatre.

Third and Fourth Years:

Fifteen 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, 437

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 six 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

Three units outside the Department.

Fourth Year:

History 421, 433, and 449

Three 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 six 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 260

Prerequisites for courses to be taken in the upper years.

Reading knowledge of French or a foreign language.

Third Year:

History 321 and 333.

Three units in History.

In consultation with an adviser, six units selected from courses listed in the International Relations Major program under the headings Asian Relations, International Economy and Development, International Security and Peace Studies, and Soviet and Eastern Europe.

Fourth Year:

History 421 and 449.

History 430 or 432.

Three units elective.

An oral examination on the graduating essay.

Undergraduate Courses in History.

Medieval, Renaissance and Reformation History: 101, 207, 208, 313, 370, 372, 413, 470. See also Medieval Studies.

Modern European History: 115, 120, 122, 202, 215, 306, 315, 316, 319, 324, 325, 334, 351, 400, 405, 406, 407, 408, 425, 431, 432, 435, 438, 441.

Modern British History: 203, 310, 318, 418, 419, 460.

Canadian History: 135, 205, 302, 303, 307, 326, 329, 401, 404, 420, 426, 430, 437, 439. For supporting courses, see Canadian Studies.

American History: 201, 237, 327, 328, 338, 428, 429, 436, 442, 443, 444, 447.

Asian History: 170, 171, 270, 271, 273, 380, 381, 382, 383, 384, 385, 387, 388, 422, 423, 434, 480, 482.

Latin American History: 350, 450, 489.

International and Contemporary History: 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 Department describing in detail the courses offered each year in History 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: History 370 in the third year, History 470 in the fourth year, and History 313 and 372 in either year.

INDIC LANGUAGES—see Asian Studies: South Asian Languages.

INDONESIAN—see Asian Studies.

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 B.A. degree:

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), Economics 457 (1½), Geography 490 (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.)

Three units from: History 425, 430, 432 and 436

Three units from: Political Science 360, 361, 362 (1½), 363 (1½/3), 364, 365 (1½/3) and 366 (1½).

Nine units from one or two of the following groups:

Asian Relations

Anthropology 302-303
Anthropology 402-405
Anthropology 430
Asian Studies 405
Asian Studies 420
Asian Studies 438 (1½)
Asian Studies 450
Economics 341-344 (1½)
Geography 380 (1½)
Geography 385 (1½)
Geography 390 (1½)
Geography 425 (1½)
Geography 468 (1½)
Geography 481 (1½)
Geography 483-484 (1½)
History 309
History 380
History 385
History 422-424
Political Science 321-324
Political Science 365 (1½)
Political Science 421 (1½/3)
Sociology 460 (1½/3)

International Economy and Development

Anthropology 316 (1½/3)
Anthropology 330
Anthropology 414 (1½/3)
Anthropology 430
Asian Studies 420
Asian Studies 450
Economics 334
Economics 341-342 (1½)
Economics 355 (1½) or both 455 (1½) and 456 (1½)
Economics 440
Economics 487
Geography 362 (1½)
Geography 380 (1½)
Geography 385 (1½)
Geography 468 (1½)
History 380
History 423
Political Science 327 (1½/3)
Political Science 364
Political Science 366 (1½)
Political Science 463 (1½)
Sociology 301 (1½/3)
Sociology 330 (1½/3)
Sociology 460-461 (1½/3)

International Security and Peace Studies

Anthropology 430
Geography 329 (1½)
History 310
History 334
History 350
History 402-403 (1½)
History 407
History 425
History 430
History 432
History 436-437
History 441 (1½)
History 448 (1½)
Political Science 327 (1½/3)
Political Science 360-361
Political Science 362 (1½)
Political Science 363 (1½/3)
Political Science 364
Political Science 366 (1½)
Political Science 460 (1½/3)
Political Science 461-463 (1½)
Political Science 465 (1½)
Psychology 308
Sociology 301 (1½/3)
Sociology 460-462

Canada and the Americas

Anthropology 353 (1½)
Geography 395 (1½)
Geography 468 (1½)
Geography 495 (1½)
History 350
History 430

History 436
History 437
History 450
History 489 (1½)
Political Science 320
Political Science 363 (1½/3)
Political Science 420 (1½/3)

Soviet and Eastern Europe
Economics 387 (1½)
Economics 487
Geography 394 (1½)
Geography 493 (1½)
Geography 494 (1½)
History 324
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, Mauzy, Wallace, and Zacher (Political Science), Goldman and Harnetty (Asian Studies), Kotwal (Economics), North (Geography), Fernando (Anthropology and Sociology), and Czaykowski (Slavonic Studies).

Note: Requirements for the Major will be revised for students entering the program beginning in September, 1991. They will be expected to have taken all three of:
Economics 100
History 120 or 125
Political Science 260
and to have fulfilled the Language Requirement. In addition, they will be required as part of the Major to take six units of a language other than English in addition to the Faculty of Arts Language Requirement.

ITALIAN—see Hispanic and Italian Studies.

JAPANESE—see Asian Studies.

KOREAN—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., B.A., and the Diploma in Applied Linguistics.

Requirements for the B.A. degree:

Major in Linguistics

First and Second Years:
Six units of a language other than English, at University level or equivalent.
First Year:
Linguistics 100 is recommended.
Second Year:
Linguistics 200.
Third Year:
Linguistics 300, 301, 400, 401.
Additional required courses normally taken in the fourth year may be taken with special permission.
Fourth Year:
Linguistics 319, and at least six additional units from senior courses in Linguistics, or in cognate fields with special permission.

Honours in Linguistics

First and Second Years:
As for Major.
Admission to Third Year:
At least high second-class average in the first and second years.
First-class standing in Linguistics 200.
Third Year:
Linguistics 300, 301, 319, 400, 401.
Additional required courses normally taken in the fourth year may be taken with special permission.
Fourth Year:
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 460: Historical Phonetics and Phonology of French.
French 462: Historical Morphology and Syntax of French.
French 464: Historical Lexicology of French.
French 472: Morphology of the French Language.
French 473: Syntactical Description of the French Language.
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.
Italian 515: Topics in 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 407: Special Aspects of Peninsular and Latin-American Linguistic Areas.
Spanish 507-8: 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 401.
Linguistics 300, 301, 400, and 401 are normally taken in the third year.
At least three additional units selected from:
Psychology 301, 304, 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
Linguistics 301 or 401

Linguistics 300, 301, 400, and 401 are normally taken in the third year.
Three additional units in Linguistics courses numbered 300 or above.
Six units chosen from Psychology 301, 304, 313.

Note: Students taking Honours in Speech Sciences should be aware that Linguistics 301, 319, and 401 are necessary for graduate studies in Linguistics.

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. This program is not designed to provide practical training in any particular language skills.
2. The program can be completed in one year of full-time study, but may be taken part-time. It should be finished within a period of five years.
3. A variety of programs may be arranged; for example:
   (a) with illustrative material drawn from one or more of the languages covered in the methods courses for language teachers. If the methods courses do 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: completion of a program of Initial Teacher Education for either elementary or secondary teaching, including courses in the teaching methodology appropriate to the languages to be taught.
5. Fifteen additional units of course work will be required to complete the program, at least nine of which must be in Linguistics.
6. At least six units from the following courses (or their equivalents taken as part of the first degree) are compulsory:
   At least three units chosen from Linguistics 300/301 or 400/401
   and
   At least three units chosen from Linguistics 319, 435, 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 nine units (including at least three 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.

MATHEMATICS

The Department of Mathematics offers programs of study that lead to the degrees of Ph.D., M.A., M.Sc., B.A., B.Sc. For information on the Bachelor of Science degree, see the **Faculty of Science** section of the Calendar.

Requirements for the B.A. degree:

Major

The Department offers a large selection of courses in various areas of pure and applied mathematics which require various levels of mathematical sophistication. B.A. programs combining Mathematics with another subject such as Economics, English, Linguistics, Music, Philosophy, etc., are encouraged. The student is advised to consult a Mathematics Major adviser in order to design a coherent program of study suitable to the student's interests and abilities.

First and Second Years:

Mathematics 100 and 101, or 120 and 121	(3)
Mathematics 200 and 201, or 226 and 227	(3)
Mathematics 220[1]	(1½)
Mathematics 221 or 223, and 315[1]	(3)
Computer Science 124, and either 118 or 126 (recommended but not required)	(1½-3)
Third and Fourth Years:	
Mathematics courses numbered 300[1] or above	(10½)
Mathematics, Statistics, or Computer Science courses numbered 300 or above	(4½)

Note: [1] One of Mathematics 220 or 315 may be delayed until the third year. However, Mathematics 315 will not count toward fulfilling the requirements listed under the third and fourth years.

Recommendations:

1. Mathematically able students are encouraged to take the Honours stream Mathematics 120, 121, 223, 224, 226, and 227. Students completing the last four courses in this sequence are not required to take Mathematics 220.
2. Students interested in Computer Science courses should consider taking Computer Science 210 in the second year.
3. Mathematics 302 and 307 (or 224) are courses which are useful in many areas of mathematics and are recommended for all mathematics majors.
4. Students interested in pursuing statistics in some depth should take Mathematics 302/Statistics 302 in the second year so as to complete the sequence Statistics 305, 306, 404, 405 by the end of the fourth year. Mathematics 303 and 314 (or 320) are also recommended for these students.
5. Students interested in operations research should take Mathematics 340, 341, and 342. They are also advised to take Mathematics 303, Statistics 305 and 306, and some advanced Computer Science courses.
6. Students interested in teaching are advised to take Mathematics 310, 311, and 445.
7. Students interested in economics should consider taking Economics 420 and should consult an adviser in the Economics Department for other appropriate Economics courses.
8. In selecting electives, students should consider pursuing in some depth an area of application of mathematics. They should also ensure that the general requirements of the Faculty of Arts are satisfied.

Honours

First and Second Years:
Mathematics 120 and 121 (or 100 and 101).
Mathematics 223 and 224.
Mathematics 226 and 227 (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 nine units chosen from Mathematics 400, 418, 420, 422-428.

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.
Six units chosen from Mathematics 321 (or 300), 322, 323.
At least six units chosen from: Mathematics 400, 418, 420, 422-428.
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 Mathematics 223 and 226 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 specialize in Medieval Studies may do so either by taking an interdisciplinary Major program in Medieval Studies, or by completing a Major program in a particular department of the Faculty of Arts, with outside electives taken from the courses listed below. (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 from 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 (same as History 384).
Classical Studies 331 (3) Ancient History.
Classical Studies 333 (3) The Roman Empire. Prerequisite: Classical Studies 331 or permission.

Classical Studies 431 (1½) Topography and Monuments of Ancient Rome.
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).
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 407 (3) Medieval French Literature.
French 460 (1½) Historical Phonetics and Phonology of French. Prerequisite: French 356 or 456.
French 462 (1½) Historical Morphology and Syntax of French. Prerequisite: one year of Latin or permission of the instructor.
French 464 (1½) Historical Lexicology of French.
Germanic Studies 510 (1½/3) Old Icelandic.
History 313 (3) The Renaissance.
History 370 (3) Social History of Medieval Europe.
History 372 (3) Ideas and Institutions of the Middle Ages.
History 387 (1½) Medieval India.
History 470 (3) Seminar in Medieval History.
Italian 401 (3) Italian Literature of the Middle Ages.
Italian 405 (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) Medieval Seminar.
Medieval Studies 449 (3/6) 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 333 (1½) Ancient Philosophy—A.
Philosophy 343 (1½) Ancient Philosophy—B.
Philosophy 373 (1½) Medieval Philosophy—A.
Philosophy 383 (1½) Medieval Philosophy—B.
Religious Studies 341 (3) Islamic Art and Archaeology (same as Fine Arts 359).
Religious Studies 408 (1½) Topics in Medieval Judaism.
Spanish 335 (3) Survey of Spanish Literature from its Origins to 1700.
Spanish 403 (3) History of the Spanish Language.
Spanish 407 (1½/3) Special Aspects of the Peninsular and Latin American Linguistic Areas.
Spanish 427 (1½/3) Selected Topics in Medieval Literature.

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 220 and 221, Indians of B.C.; 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, internships, 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 secondary 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 secondary 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 School of Music offers a B.A. degree in music designed for students interested in studying music as one of the liberal arts. The degree is also an alternative to the B.Mus. degree in Music Theory and Music History and Literature for students interested in graduate work in those fields, or in ethnomusicology. Students wishing to become professional performers, composers, or teachers should, if qualified, consider the appropriate Major in the B.Mus. program.

Admission Requirements

There are no performance requirements for entry into the B.A. in Music. Students taking ensemble or private instruction courses will need to audition at the School of Music for placement purposes.

Requirements for the B.A. degree:

Note: For the general course requirements of the B.A. degree, see **Faculty Requirements** at the beginning of the **Faculty of Arts** section.

Major

First Year:
Music 120 and 121.
One of:
Music 103 and 104 or
Music 100, 101 and 105 or
Music 100, 101 and ensemble.

Second Year:
Music 220 and 221.
One of:
Music 203 and 204 or
Music 200, 201 and 205 or
Music 200, 201 and ensemble.

Third and Fourth Years:
A total of 30 units, including:
24 units at the 300 or 400 level[1]
15 units of 300- or 400-level Music courses[1]
At least six units of electives outside Major subject.

When entering the Major program at the beginning of the third year, the student must draw up a plan of study for the last 30 units of course work, in consultation with a School of Music adviser. Another review by an adviser must precede the final 15 units.

Honours

First and Second Years:
As for Major.

Third and Fourth Years:
A total of 36 units is required, including:
21 units of 300- and 400-level Music courses[1] including Music 449 and at least nine units in music theory, music history, or ethnomusicology
At least 30 units at the 300 or 400 level[1]
At least nine units of non-Music courses
Minimum second-class average in each year

The Honours program is open only to students who show special aptitude and the capacity to profit from working extensively in this field. The School may terminate a student's candidacy for Honours if, after a prescribed process

of evaluation, it decides that an appropriate level is not being maintained, a second-class average notwithstanding.

Note: ¹ Any 300- or 400-level Music course, as well as Music 107 (Composition I), is acceptable toward fulfilment of the requirement.

Even though the ensemble courses in Music have 100 numbers, they will count as 300- or 400-level courses, and hence as part of the Major or Honours requirements, subject to the following qualifications: 1) a third- or fourth-year student wishing to count ensembles toward a Major or Honours requirement must have taken two units of ensemble work as part of the theory prerequisite for the Major or Honours degree; and, having satisfied this condition 2) such a student may elect at most a further four units of large or small ensemble work as part of the Major or Honours requirement.

Only 300- and 400-level private instruction will count in fulfilment of this requirement. Up to four units of private instrumental or vocal lessons may be elected during the last two years of this program, a maximum of two in any year. Students will be placed at the appropriate level by audition.

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 Department.

Requirements for the B.A. degree:

Major

First and Second Years:

Philosophy 250 and any three units from Philosophy 100, 102, 103, 115, 210, 214.

If Philosophy 250 has not been taken in the second year, Philosophy 350 may be taken in the 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 the second year.

4½ units from Philosophy 302, 333, 343, 353, 363, 420, 450 or 451, 453, 460, 470, 473, 483, 490.

Additional units in third- and fourth-year Philosophy courses (exclusive of 350, 410 and 411) or Greek 407 (only 1½ units from Greek 407 may be counted toward the Major program) 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

Students are admitted to the Honours program at the discretion of the Department. Applicants are normally expected to have obtained a first-class mark in Philosophy 250 and a recommendation from a Philosophy instructor.

First and Second Years:

Philosophy 250 and three units from Philosophy 100, 102, 103, 115, 210, 214.

Third and Fourth Years:

Philosophy 302 or 402.

Six units of tutorial work (Philosophy 330 or 430).

Additional units in third- 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 Honours program) 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.

Special Honours Programs in Philosophy and Another Subject

First and Second Years:

Philosophy as in Honours Philosophy. Courses in the other subject as required by the other Department.

Third and Fourth Years:

Philosophy 302 or 402 and at least six units of Tutorials (Philosophy 330 or 430).

Additional units to a total of at least 15, chosen from third- and fourth-year Philosophy courses in consultation with the Departmental Honours adviser.

Courses in the other subject as required by the other Department.

At least six units of courses outside either subject.

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 B.A. degree:

Major

Second Year:

Political Science 200 and two from 220, 240, 260, 280.

Third and Fourth Years:

Fifteen units in courses in Political Science numbered 300 or above.

Honours

First and Second Years:

As for the Major—with a minimum of first- or second-class standing in a full three-unit course 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, 380, 390, 490, and 491

4½ additional units in Political Science (only three units may be offered for credit in Political Science from courses offered by other departments)

Fifteen additional units, of which at least six 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 departmental 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 standing in Political Science 260.

Two of: Political Science 200, 220, 240, 280.

Three units from History 100-199, chosen in consultation with an adviser in the International Relations Program.

Asian Studies 105, 206, Economics 100 are recommended.

Third and Fourth Years:

36 units including:

Political Science 340 and 380

Six 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, 388, 440, 455, and 456.

Anthropology 412, 430 (note prerequisites; by permission of Anthropology Department only).

Geography 329.

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 a pamphlet each May 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, see the **Faculty of Science** section of the Calendar.

Requirements for the B.A. degree:

Major

First and Second Years:

Psychology 100 and 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-Major 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 and 200.

Three units of Mathematics (100 and 101 recommended).

Biology 101 or 102.

*Third Year:**

A minimum of 18 units taken concurrently including:

Psychology 312 and 316 (Honours section).

*Fourth Year:**

A minimum of 18 units taken concurrently including:

Psychology 449 and at least three 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 the 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 the instructor) is prerequisite for 304, 401, and 420.

There are additional prerequisites 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 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.

PUNJABI—see Asian Studies: South Asian Languages.

RELIGIOUS STUDIES

The Department of Religious Studies offers programs of study that lead to the degrees of Ph.D., M.A., B.A.

Requirements for the B.A. degree:

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 or above.

Honours

Admission:

Religious Studies 100 or Religious Studies 202 AND 204. Continuation in fourth-year Honours is conditional upon maintaining at least 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 the program, the student may be expected to acquire a reading knowledge of Arabic, 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.

Near Eastern Religions: 202 and

Hebrew Bible and the Ancient Near East: 300, 303, 306, 403.

New Testament: 314, 414, 415.

Hebrew: 305, 405, 479.

Judaism: 208, 309, 310, 407, 408, 409.

Islam: 340, 341, 448, 449.

Christianity (Post-Biblical): 205, 315, 321, 323, 326, 327, 420.

Asian Religions: 204 and

Hinduism: 354, 452.

Buddhism: 364, 367, 431.

Religions of China: 365, 366, 430.

Religions of Japan: 361.

Major and Honours: 370, 479, 499.

The following courses may be accepted for credit in Religious Studies, subject to the approval of the Department:

Asian Studies 360: The Making of the Sikh Tradition.

Italian Studies 310: The Divine Comedy in Translation.

ROMANCE STUDIES—see Hispanic and Italian Studies.

RUSSIAN—see Slavonic Studies.

SANSKRIT—see Asian Studies: South Asian Languages.

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 B.A. Degree:

Major

At least two years of Russian, Polish, Czech/Slovak, or Ukrainian (which may be taken in the third and fourth years), or the equivalent.

Slavonic Studies 105.

Fifteen additional units in third- and fourth-year Slavonic Area Studies courses chosen from those listed below, including:

Slavonic Studies 447 or 448.

Geography 394 and **one of** Geography 493 or 494.

at least one of History 324, 405, 438.

at least three units from Political Science 325, 362, 460 (section dealing with Soviet foreign policy), 464 (section dealing with Soviet-American relations). Students should check for prerequisites if intending to take Political Science 460 or 464.

Students' attention is drawn to the possibility of combining the Slavonic Area Studies Major with another Major (e.g. History or Russian or Sociology). 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, Buchanan E165.

Courses:

Slavonic Studies 306: Russian Literature in Translation.

Slavonic Studies 307: Modern East European Literatures in Translation.

Slavonic Studies 308: Tolstoy and Dostoyevsky in Translation.

Slavonic Studies 310: Studies in Russian Culture.

Slavonic Studies 446: Women in Russia.

Slavonic Studies 447: Seminar in Slavonic Area Studies I.
Slavonic Studies 448: Seminar in Slavonic Area Studies II.
Economics 387: The Soviet Economy.
Geography 394: Geography of the Soviet Union: Thematic Analysis.
Geography 493: Geography of Eastern Europe.
Geography 494: Geography of the Soviet Union: Regional Analysis.
History 319: History of Modern Poland.
History 324: History of East Central Europe in the 19th and 20th Centuries.
History 325: Germans and Slavs in the Early Modern Period.
History 405: Russia before 1917.
History 408: History of the Habsburg Monarchy.
History 435: Communist Movements in Russia and Eastern Europe since 1900.
History 438: History of the Soviet Union.
Political Science 325: Soviet and East European Politics.
Political Science 362: Foreign Policies of the Superpowers.
Political Science 460: Foreign Policy analysis (section dealing with Soviet foreign policy).
Political Science 464: Problems in International Relations (section dealing with Soviet-American relations).

Students' attention is also drawn to the following course:
Economics 487: Comparative Economic Systems.

Note:
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 Slavonic culture. Students wishing to do graduate work in the area will normally be required to have completed at least two years of a Slavonic 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, Dr. Robert North, Department of Geography.

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 B.A. degree:

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 206.

Third and Fourth Years:
Russian 300 and 400; 3-6 units from Russian 303, 305, 315; and at least six 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 **Slavonic Area Studies**.

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.
Three units in Slavonic Area Studies.
At least nine 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.

Notes: 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) literatures 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 B.A. degree:

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 courses in Anthropology and Sociology taken in consultation with a departmental adviser.

Honours:

Second Year:
Sociology 200.

Admission to the Honours Program:
An overall second-class average in the second year and a standing of 75% or better in Sociology 200 is required for admission to the third year. Continuation to the fourth year requires an overall second-class average in the third year and an average of 75% or more in Sociology courses taken in the third year. Outstanding students from the third-year Major program may on occasion be considered for admission into the fourth-year Honours program. Interested students should consult the departmental Sociology Honours adviser.

Third and Fourth Years:
A total of 36 units including 21 units in Sociology as follows:
— Sociology 310, 318, 350, 400, 490.
— one of: Sociology 380, 381, 382, 383.
— three units of tutorial work organized around the completion of a substantial essay (Sociology 449).
— three additional units in Sociology.
— 15 additional units, of which at least six must be taken in other disciplines.

Undergraduate Courses:
Sociology 200 is the prerequisite for most third- and fourth-year courses. General courses that do not require the prerequisite, and are open to all students, are: Sociology 100, 200, 201, 210, 213, 214, 215, 220, 240, 250, 260, 301, 315, 352, 354, 360, 465, and 466.

Each May the Department issues a pamphlet to inform students in detail about courses that will be offered the following September. Students should obtain a copy before choosing courses.

SOUTH ASIAN STUDIES—see Asian Studies.

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 B.A. degree:

Major in Theatre

First and Second Years:
Theatre 120 and either 160 or 150 or both.

Third and Fourth Years:
15 units in Theatre, numbered above 300, including Theatre 310 and 320.

Major in Film/Television
The selection of students for admission to the Film/Television Major program normally takes place during the week after term finishes (end of April, beginning of May). Prospective candidates should contact the Theatre Department to learn of admission requirements and to make appointments for interviews.

Second Year:
Theatre 230.

Third and Fourth Years:
Theatre 330, 333, 431, 433.
Three units chosen from: Theatre 305, 310, 320, 345, 351, 354, 400, 410, 451, 454.

Honours in Theatre

Admission:
Theatre 120 (First- or second-class standing).
Theatre 160.

Third and Fourth Years:
18 units in Theatre numbered above 300, including Theatre 310, 320, 410, 449.
Six 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 B.F.A. degree:

The program leading to the B.F.A. degree normally consists of four years of study. In the first year, students take courses applicable to any B.A. program, including the Theatre courses noted below. Application to enter the B.F.A. program proper is made early in April of the student's first year or the week before the beginning of classes in 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 160.

Second Year:
Requirements of second-year B.A. including Theatre 261 and 262.

Third Year:
Theatre 310, 361/362/370, and three units of electives.

Fourth Year:
Theatre 320, 461/462/470, and three units of electives.

Design/Technical Theatre

First Year:
Requirements of the first-year B.A. including Theatre 120 and 150.

Second Year:
Requirements of second-year B.A. including Theatre 250 and 251.

Third Year:
Theatre 305, 310, four courses chosen from Theatre 350-354, and three units of electives.

Fourth Year:
Theatre 320, 459, four courses chosen from Theatre 405, 450-454, and three units of electives.

Requirements for the Diploma in Film/Television Studies:

Applicants must have completed a Bachelor's degree in Arts, Science, or Commerce.

The program will take two years of part-time study. Additional courses, above the three required, may be taken on an elective basis. 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 431
Theatre 330	Theatre 433
Theatre 333	

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 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 departmental 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 will normally take 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 have prerequisites. Students should discuss them with the department concerned before registering.

Anthropology 310
Architecture 424, 425
Commerce 307, 409
Economics 374
Geography 350, 351, 352, 357, 360, 417, 450, 453, 457, 464
History 208
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, Dr. W. G. Hardwick (Geography), tel. 228-3535.

URDU—see Asian Studies: South Asian Languages.

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 Committee Co-ordinator, Dr. Valerie Raoul, 228-4033 (Buchanan Tower 724).

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: Women in Classical Antiquity.
French 419: Women's Literature in France and French Canada.
Slavonic Studies 446: Women in Russia.

Social Sciences
Anthropology/Sociology 213: Women in Comparative Perspective.
Anthropology/Sociology 312: Gender Relations.
Family Science 442: Economic Roles of Women.
Psychology 320: Psychology of Sex Differences.

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 Co-ordinator has information about additional courses offered in a particular year. Several departments, such as English, French, and the School of Social Work, offer graduate courses dealing with feminist theory in some years. Others, such as Geography, offer directed reading courses in relevant areas.

Humanities
English 314, 363, 421, 433, 451.
Fine Arts 337/437, 339/439, 369/469.
Hindi 410.
History 307, 316, 329, 419, 422, 423, 431, 443.

Social Sciences
Anthropology/Sociology 214.
Anthropology 316, 329, 413.
Family Science 322, 414.
Social Work 302.
Sociology 240, 352, 413, 453, 475.

THE SCHOOL OF AUDIOLOGY AND SPEECH SCIENCES

(A School Within the Faculty of Medicine)

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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 externships, with at least one externship in audiology and one in speech-language pathology; the third externship is determined by the student's major area of interest. During each clinical externship 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 externships, divided between at least two different clinical settings. During these externships, 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 Syntax or in Phonology (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, including the "Additional Information" form, completed and signed.
(2) 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.
(3) 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.

(4) 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.
(5) 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).

Some applicants may wish to include a resumé providing more detail concerning previous education and employment than can be included on the application form

All the application documents, including the letters of references and the transcripts should be sent to the Graduate Adviser (see address below), 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 $200.00 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 $11,000/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
PHYL 510 - Sensory-motor Integration

Term II
AUDI 500 - (continued)
AUDI 502 - (continued)
AUDI 504 - (continued)
AUDI 505 - (continued)
AUDI 507 - Neurolinguistics
AUDI 508 - (continued)
AUDI 509 - (continued)
PHYL 510 - (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 501 - (continued)
AUDI 503 - (continued)
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
AUDI 547 - Directed Reading

Term II
AUDI 501 - (continued)
AUDI 511 - (continued)
AUDI 544 - (continued)
AUDI 547 - (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

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2. Master of Business Administration (M.B.A.).
3. Master of Science in Business Administration (M.Sc. (Bus.Admin.)).
4. Doctor of Philosophy (Ph.D.).

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The four year program, consisting of a pre-Commerce year in another faculty and three 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 two and a half years are devoted to laying a foundation in the related sciences and the humanities, and to introducing the student to basic business issues, principles and practices.

The professional aspects of the curriculum are largely concentrated in the last one and a half years. Because of the breadth and variety of issues involved, all students must take a specified "core" of courses and then arrange a series of carefully selected and integrated courses to complete an option. The necessary core courses are set out in the calendar. Students may contact the Commerce Undergraduate Office for details for each option in the four year program.

Admission to the Bachelor of Commerce Program

The Faculty has been authorized to restrict enrolment in Commerce. It should be noted that because of the high demand for the B.Com. program, completion of minimum prescribed requirements does not guarantee admission. In most cases the competition for places is such that standing above the minimum prescribed requirement is necessary to ensure admission. **In evaluating applications, emphasis is placed on the pre-Commerce requirements of English, Economics, and Mathematics.**

In assessing applicants who have completed more than one year in other Faculties, emphasis will be placed on Commerce-related course work. Further details may be obtained from the Commerce Undergraduate Office. Students previously registered in the Faculty of Commerce who were required to discontinue or who failed their year will normally be considered in competition with other eligible candidates.

Admission from Another Faculty

Students who have completed a first-year university program of at least 15 units may apply for admission to the Commerce program. Applicants must have completed English 100, Economics 100, Mathematics 140 and 141 (Mathematics 100 and 101 or 120 and 121 are acceptable alternatives) and two electives. Electives must not include any business or statistics courses. If Mathematics 111 is taken, Mathematics 141 must be taken in second-year Commerce, in lieu of an elective.

Students who have completed a first-year university program, with no failures, but are deficient one or more of the core courses may qualify for consideration in two ways: (1) attend a College and take a second-year Commerce transfer program which includes the deficient core course(s); or (2) continue to a second year at the university in a program that includes the deficient core course(s) and include further courses in the other core areas. Information on

recommended courses may 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 requirements of the Faculty in which they are registered. Students who have successfully completed 15 units of pre-Commerce studies in Winter Session but who are deficient in one core course may apply to the Director of the Undergraduate Program for permission to complete the deficiency in Spring Session.

Admission from College Commerce Transfer Programs

Students who have completed second-year Commerce at a college offering a UBC transfer program are eligible to be considered for admission to third-year Commerce if their average is 60 percent (or equivalent) in the most recent year of studies. **Attainment of the minimum prescribed 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. Transfer credit will be assessed only after a formal application for admission to the program has been made. An average of at least 60 percent (or equivalent) is required to be considered for admission. Students who have been required to withdraw from another university will not be considered. Students who have been accepted into the Bachelor of Commerce program must be in attendance at UBC and registered in the Faculty for a minimum of two Winter Sessions.

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. After gaining admission to the Faculty, mature students must satisfy the pre-Commerce core course requirements and may be granted exemption from electives to a maximum of 6 units. Preference is given to mature candidates who have recently completed a university level calculus course.

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. Applicants should be aware that registration begins before this deadline.

Option 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
2. Finance
3. Industrial Administration
4. Industrial Relations Management
5. International Business
6. Management Information Systems
7. Marketing
8. Transportation and Logistics
9. Urban Land Economics

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 15.0 units in any year. 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 is 80% or better in the full courseload of the final two years.

Unsatisfactory Performance

Students whose performance in the Faculty of Commerce and Business Administration is unsatisfactory will be required to discontinue study in the Faculty for a least one year. Students who have failed to meet the promotion requirements of the University will be considered to have failed the year and will be required to discontinue study in the University for a least one year.

(1) Students will be required to discontinue study in the Faculty for a least one year if they:

a) pass all courses in which they are registered but achieve an average below 55%, or

b) fail one or more of the courses in which they are registered and obtain an average below 60% in the courses passed.

(2) Students will be considered to have failed the year and will be required to discontinue study at the University for at least one year if:

a) they are registered in 15 or more units and receive a failing grade in 6 or more units, or

b) they are registered in less than 15 units and receive a failing grade in one-third or more of the units in which they are registered.

(3) Course withdrawals without prior permission and which result in a "W" recorded on transcripts will be considered failures in determining advancement potential.

(4) Students at any level of University study who are required for a second time to discontinue studies in the Faculty, whether in repeating a year or in a later year, will be required to withdraw from the University. Readmission to Commerce in such cases is normally not granted.

(5) Students who fail the year or are required to discontinue study in the Faculty may apply for readmission only after 12 months.

(6) Students who are readmitted after being required to discontinue study in the Faculty or after a failed year will receive credit towards the B.Com. degree only for those courses in that year in which a grade of at least 65% was obtained.

(7) Any students whose academic records, as determined by the tests and examinations of the first term, are found to be unsatisfactory may be required to discontinue attendance in Commerce for the remainder of the session.

Supplementals

If a student's general standing in the final examinations of any year is sufficiently high, the Faculty may grant supplemental examinations to 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:

(1) The Faculty may grant supplemental examinations to a maximum of 3 units.

(2) In order to be eligible for consideration a student must have obtained at least 40% in the course in question and an average of not less than 60% in all other courses taken during the session.

(3) Supplemental examinations normally are provided in Commerce courses where the final examination accounts for 40% or more of the final grade in the course.

(4) A supplemental examination will have essentially the same scope as the final examination; and will, when written and passed, stand as a substitute for the final examination in any circulation of the final course grade.

(5) Information on which courses have supplemental examinations will be published and made available to students in the Guide to Undergraduate Courses.

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 at the first available sitting in September. The test will also be given during the December Examination period, in late March 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.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

(1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.

(2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

Students who fail to satisfy the English Composition requirement within the one academic year will be required to discontinue their studies in the Faculty. They may apply for readmission once the requirement is satisfied.

Degree Completion

Students are required to complete their degree requirements within six years of their original admission into the Faculty of Commerce and Business Administration.

REGULATIONS REGARDING COMMERCE COURSES

(1) Students are required to declare their field of concentration (option) no later than the end of the fall term of the third year in the program. Transfers from one option to another after registration in the winter term of the third year may be made only 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 Program.

(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 students registered in Second Year are required to complete a course in public speaking provided by the Faculty. To qualify for the degree of Bachelor of Commerce, this requirement must be satisfied.

(6) Courses in Commerce generally are reserved for students registered in a degree program in Commerce. However, there are exceptions to this general regulation. Special registration arrangements have been made for students registered in other Faculties in programs, as approved by Senate, which specifically require Commerce courses.

(7) Students who have obtained a first class average in their third year may elect to register for 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 Approval

Students are reminded of the university rule regarding program responsibility. Students are responsible for the completeness and accuracy of registration as it relates to the regulations of the program in which they are enrolled. Any variation from a full load must be approved by the Director of the Undergraduate Program.

Prerequisites

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 but are outlined in the Guide to Undergraduate Course Offerings.

Electives

Electives are chosen to complement the choice of option as well as to broaden the student's general education. Many senior level courses require junior prerequisites so students should select lower level electives carefully. At least 6 units of 300- or 400-level electives must be taken in a Faculty other than Commerce in the third and fourth years combined. All electives in the third and fourth year, whether Commerce or non-Commerce, must be at the 300 level or higher. Any exceptions must be approved by the Director of the Undergraduate Program.

PROGRAM REQUIREMENTS

The following program requirements represent the core courses of the B.Com. degree. In addition students in Third Year must select an Option and complete the specific Option Program Requirements set out below.

First Year: 15 units

ENGL 100; ECON 100; MATH 140/141*; 6 units of non-Commerce electives.

*Acceptable alternatives are MATH 100/101, 120/121, or 111. In the latter case, MATH 141 must be taken in Second Year in lieu of an elective.

Second Year: 16 units

ECON 201; COMM 001, 290, 291, 292, 293, 294, 296, 297; 3 units of non-Commerce electives.

Third Year: 17.5 units

COMM 391, 392, 393, 394, 396, 397; 3 units of non-Commerce electives; 4.5 units of Option requirements and electives.

Fourth Year: 18 units

COMM 491; one of COMM 339, 492, 493, 494, 498; 3 units of non-Commerce electives; 12 units of Option requirements and electives.

Note: In addition to the required 6 units of non-Commerce electives, additional electives in Third and Fourth years may be either Commerce or non-Commerce courses. Please refer to section on Electives for more information.

OPTION PROGRAM REQUIREMENTS (Third and Fourth Years)

Accounting

Third Year	Fourth Year
Commerce 353, 354	Commerce 453, 454 One of COMM 355, 451, 452, 455, 459 7.5 units of electives

Commerce and Economics
Third and Fourth Years Combined

3 units of 300- or 400-level Economics
6 units of 400-level Economics
3 units of 300- or 400-level Commerce
4.5 units of electives

Note: Students completing an option in Commerce and Economics may not take Economics courses as their non-Commerce electives.

Finance

Third Year	Fourth Year
COMM 371, 374 1.5 units from COMM 376, 377, 378, 379	3 units from COMM 471, 472, 475, 478 9 units of electives

Note: Credit will not be given for both ECON 345 and COMM 376.

Industrial Administration

Third Year	Fourth Year
COMM 327, 328, 383	COMM 421, 427, 483 6 units of electives

Industrial Relations Management

Third Year	Fourth Year
COMM 327, 328 1.5 units of electives	COMM 421, 427, 428 7.5 units of electives

International Business

Third Year	Fourth Year
7.5 units of approved 300- and 400-level internationally oriented courses	15 units of approved electives to complete option requirements specified below.

This option has very limited enrolment. Students must achieve a first-class average in the first two years of their program and will be admitted to the option only after an interview with a faculty review panel. By the end of the program students must have:

i. completed at least 3 units of language study, preferably at a foreign institution (or equivalent);
ii. obtained at least second-class standing in at least 3 additional units of 300-level (or higher) course work in an approved foreign language;
iii. taken at least 9 units of approved area studies with at least 1.5 units in each of (a) politics (b) history and culture, and (c) economics;
iv. at least 6 units of the 7.5 units of option electives required must be internationally oriented Commerce courses.

Students contemplating entering this option should consult with the Faculty at the earliest possible date to ensure that prerequisites for the language study and other required courses are taken at the earliest possible time.

Management Information Systems

Third Year	Fourth Year
CPSC 210, 213 COMM 391 (1st term) COMM 335 (2nd term)	COMM 436, 437, 438, 439

Note: A prerequisite to both CPSC 210 and 213 is computer programming skill to the level of CPSC 116 or 118.

Marketing

Third Year	Fourth Year
COMM 362, 363, 365	COMM 468 1.5 units from COMM 460, 461, 462, 463, 464, 465, 466, 467, 469 9 units of electives

Transportation and Logistics

Third Year	Fourth Year
COMM 341, 349, 394T*	COMM 447, 449
1.5 units of electives	1.5 units from COMM 441, 444, 445
	7.5 units of electives

*Special section of Commerce 394 required.

Urban Land Economics

Third Year	Fourth Year
COMM 307, 309, 334	COMM 407, 408
	COMM 406 or 409
	7.5 units of electives

Note: Recommended electives — one of COMM 376, 471, ECON 345, 447, or PLAN 425 (credit for ECON 345 will be split into 1.5 units of Commerce credit and 1.5 units of non-Commerce credit).

Five-Year B.Com. Program

Students who registered initially in the five-year B.Com. program (prior to September, 1987) should see the Director of the Commerce Undergraduate Program regarding the requirements to complete the B.Com. degree.

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 Option 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 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) Graduates of the B.Com. program Accounting Option, will be granted certain exemptions for this professional designation. Students enrolling in this program should consult the Society of Management Accountants or the student bulletins available on campus for detailed exemption information.

(b) Graduates of the B.Com. program, any option (other than the Accounting), 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.

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 Real Estate Financing Course:** A correspondence course meeting the requirements for licensing under the British Columbia 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.

THE SCHOOL OF COMMUNITY AND REGIONAL PLANNING

(A school within the Faculty of Graduate Studies)

Professors
H. CRAIG DAVIS, B.S.E.E. (Purdue), M.A., Ph.D. (Berkeley).
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).
BRAHM WIESMAN, B.Arch., M.Arch. (McGill)

Associate Professors
PETER BOOTHROYD, B.A. (Toronto), M.A. (Alberta).
ANTHONY H. J. DORCEY, M.A. (Aberdeen), M.S. (Wisconsin), Assistant Director, Westwater Research Centre.
J. DAVID HULCHANSKI, B.A., M.Sc., Ph.D. (Toronto), Director, Centre for Human Settlements.
WILLIAM E. REES, B.Sc., Ph.D. (Toronto).
MICHAEL Y. SEELIG, Dip. Arch. (Hammersmith), M.C.P., Ph.D. (Penn.).

Assistant Professor
JULIA E. GARDNER, B.A. (Trent), M.A. (Waterloo), Ph.D. (Canterbury).

Adjunct Professors
PAT CARNEY, B.A., M.A. (Brit. Col.).
THOMAS A. HUTTON, B.A. (Brit. Col.), B.Litt., Ph.D. (Oxon).
WILLIAM T. LANE, B.A., B.Com., LL.B. (Brit. Col.).
RAY SPAXMAN, Dip. Arch. (Nottingham), Dip. Tp. (Birmingham).
MICHAEL TURNER, Cert. Arch., B.Arch. (University College, London).
RAYMOND E. YOUNG, B.A., M.A., L.L.B. (Brit. Col.).

Honorary Professor
JONATHAN O'RIORDAN, M.A. (Edinburgh), M.A., Ph.D. (Brit. Col.).

Honorary Lecturer
OWEN A. ANDERSON, B.A., Ph.D. (Alberta).

Research Associates
JOHN COLLINS, B.A., M.Sc. (Brigham Young), Ph.D (Utah).
GEORGE D. EVANS, B.A. (Manitoba), M.A. (Maine), Ph.D. (Alberta).
EVELYN PINKERTON, B.A. (Wellesley), I.P.F.E. (Sorbonne), M.A. (Middlebury), M.A.T. (Harvard), Ph.D. (Brandeis).

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 four concentrations, the first of which is an overview of the field:

- — Urban and Regional Planning concerned with the relationship among regional development, human settlement and the use of natural resources in the context of sustainable development;
- — Urban Physical Planning concerned with land use, transportation, urban design; heritage conservation as practiced by local government;
- — Urban Policy Planning concerned with policy analysis, community development, land and housing;
- — Regional and Natural Resources Planning concerned with planning for the use of natural resources in the context of regional development 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. Over 550 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; and
- 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 Westwater Research Centre (see Index under W) and the Resource Management Sciences Program; in transportation, the Transportation Centre; in Third World Development, the Institute of Asian Research; and in urban and regional development, housing, urban governance and community development planning, the Centre for Human Settlements (see Index under H).

The Master's degree will be either a **Master of Arts (Planning)** or a **Master of Science (Planning)**, 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 university 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 January 15 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 and the natural sciences, the humanities, 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 308; to satisfy the statistics requirements it is suggested that students take either a statistics course in their undergraduate discipline or Statistics 203 or 105, and 303.

A candidate who has taken graduate courses equivalent to those described for the Master's degree 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. 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.

Orientation and Field Camp

All entering students are required to attend orientation sessions and 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 (PLAN 500-506).

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 (PLAN 510-515). Appropriate courses outside the School may be substituted.

C: Substantive Courses

These courses provide depth of knowledge within one of the concentrations 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 (PLAN 520-536).

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 of PLAN 540 are offered and students must complete a minimum of 3 units of this 1½ - 6 unit course over the two years.

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

Committees consisting of a prospective research superviser and three other faculty members are established at the time of admission to advise students and approve their programs of studies. At least one member of each 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 in the form of two research essays;
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 write their qualifying essays in the second year. These focus on planning theory, and issues and methods in the student's area of specialization. Course requirements should be completed by this time.

Students who successfully complete their qualifying essays 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 Faculty of Graduate Studies requires the thesis to be submitted to an External Examiner or Examiners approved by the Dean and at the completion of the research the candidate has to take an oral examination in defence of the dissertation.

Certificate in Site Planning

This part-time two year certificate program prepares qualified students for specialized professional practice in urban site planning focussing on the residential environment.

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 certificate program is offered by the School of Community and Regional Planning. For further information write to Certificate in Site Planning, Centre for Human Settlements, The University of British Columbia, 2206 East Mall, Vancouver, B.C. V6T 1W5.

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

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Departments of Anatomy, Pathology, Pharmacology and Therapeutics, and Physiology—See Faculty of Medicine.

Division of Continuing Education: J. Wong, Chairperson.

Lecturers from Other Departments

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K. W. TURNBULL, Clinical Associate Professor of Anaesthesiology.
R. WARREN, Clinical Assistant Professor of Surgery.

FACULTY OF DENTISTRY

General

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.

The teaching, research and clinical facilities are housed in the Dental Health Sciences building which was named the John Barfoot Macdonald Building. These facilities have been designed as part of the Health Sciences Centre to promote integrated teaching of the 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. Library facilities are provided in the Woodward Biomedical Library.

The latest concepts in educational methodology, research and training are applied in the care of patients attending the dental clinic. In addition to graduate and postgraduate programs which are also provided, there is strong emphasis on the development of the Continuing Dental Education Program for the profession. This is provided as an integral part of the Health Sciences Program which comes under the jurisdiction of the Coordinator of the Health Sciences.

Degrees

The Faculty of Dentistry offers three degrees, Doctor of Dental Medicine (D.M.D.), Master of Science in Dental Science (M.Sc.) and Doctor of Philosophy in Oral Biology (Ph.D. in Oral Biology), as well as a Postgraduate Specialty Training Program in Periodontics. Detailed information on this program is given at the end of the section on Dentistry. Information concerning the M.Sc. (Dental Science) and Ph.D. in Oral Biology may be found in the Graduate Studies section of the Calendar.

The Degree of Doctor of Dental Medicine — D.M.D.

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. Candidates who meet admission requirements but are not successful in gaining a place in the first year class with their initial application may reapply for admission in a subsequent year. However, reapplications from candidates who have already applied unsuccessfully on three previous occasions are not normally accepted, and the number of interviews is normally limited to two.

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 January 7 for admission the following September and the earliest date for applying is July 1 of the previous year. As application deadlines will be strictly enforced, applicants are reminded to allow sufficient time for application forms to reach the University.

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 or 103 (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 must 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 will be applied towards the tuition of the first term of the session for which the student has been accepted.

The Degree of D.M.D. combined with the Degree of B.Sc.

Students who have completed the third year in one of the approved degree programs of the Faculty of Science at UBC and the first two years in the Faculty of Dentistry at UBC, 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.
   (g) must submit references (forms for this purpose are included in the application materials).
   (h) may be required to attend for a personal interview at the candidate's expense.

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, 203 - 100 Bronson Avenue, Ottawa, Ontario K1R 6G8.

OR (ii) Part 1 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 January 7 for the year to which admission is sought.

(f) must submit references (forms for this purpose are included in the application materials).

(g) will be required to complete the Dental Aptitude Test (see Aptitude Testing above).

(h) may be required to attend for a personal interview at the candidate's expense.

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 and Orientation

Registration is carried out through TELEREG, the University's telephone registration system. Candidates who have been accepted for admission to the Faculty of Dentistry will be notified by mail concerning registration and orientation. The academic year normally begins September 1. Failure to complete registration by 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.

A successful applicant may be required to submit a health record to the Unversity Health Service at the time of acceptance. The approved form will be included in the acceptance package. A certificate from a licensed dentist attesting to the applicant's condition of oral health is also requested.

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 $700 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	$ 20.00	
Instruments for anatomy and physiology	$ 15.00	
Laboratory coats or clinical attire	$ 100.00	
Microscope — an approved model (first year only)	$1,000.00	
Dental Instruments—First Year	$ 807.00	(Lease)
—Second Year	$1,811.00	(Lease)
—Third Year	$ 995.00	(Lease)
—Fourth Year	$ 591.00	(Lease)
Course handouts	$ 100.00	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, the fee for which is $380 (subject to change). 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; Clinical Dental Sciences 410, 414.

Second Year:

Anatomy 425; Physiology 425; Microbiology 425; Pharmacology 425; Oral Biology 420; Oral Medical and Surgical Sciences 421, 422, 423, 425, 426, 427; Clinical Dental Sciences 420, 421, 422, 423, 424, 425.

Third Year:

Oral Biology 430; Oral Medical and Surgical Sciences 431, 433, 434, 435, 436, 437; Clinical Dental Sciences 430, 431, 432, 433, 434, 435.

Fourth Year:

Oral Biology 440; Oral Medical and Surgical Sciences 441, 443, 444, 446, 448; Clinical Dental Sciences 440, 441, 442, 443, 444, 445.

POST-GRADUATE SPECIALTY TRAINING PROGRAM IN PERIODONTICS

The Department of Clinical Dental Sciences 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.

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.

Application forms and descriptive literature may be obtained from the Secretary, Division of Periodontics, Department of Clinical Dental Sciences, Faculty of Dentistry, 2199 Wesbrook Mall, The University of British Columbia, Vancouver, B.C., Canada, V6T 1Z7.

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 University Hospital (UBC and Shaughnessy Sites), Vancouver General Hospital, the Cancer Control Agency of British Columbia and Children's Hospital, offer a one-year General Practice Residency training program commencing each June and July. The 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

Graduates of any accredited Canadian dental school are eligible for admission. All candidates must satisfy the requirements for registration of the College of Dental Surgeons of B.C. Graduates of foreign dental schools must possess a current and valid certificate from the National Dental Examining Board of Canada.

Application

Application forms and descriptive literature may be obtained from the Head, Division of Hospital Dentistry, Department of Oral Medical and Surgical Sciences, 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 15 for entry to the program the following year.

THE FACULTY OF EDUCATION

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JAMES M. SHERRILL, B.S., M.A., Ph.D. (Texas), Professor and Associate Dean.
WALTER SZETELA, A.B. (Massachusetts), M.S. (Michigan), Ed.D. (Georgia), Associate Professor.
MARVIN WESTROM, M.Ed., Ph.D. (Alta.), Assistant Professor.
REGINALD D. WILD, B.Sc., M.Ed. (Brit. Col.), Assistant Professor.
SHIRLEY M. WONG, B.Com., B.Ed. (Brit. Col.), M.Ed., D.Ed. (Oregon), Associate Professor.
JANICE E. J. WOODROW, M.Sc., Ph.D. (Brit. Col.), Associate Professor.

Department of Social and Educational Studies

JANE GASKELL, B.A. (Swarthmore), Ed.D. (Harvard), Professor and Head.
KOGILA ADAM-MOODLEY, B.A. (Natal), M.A. (Michigan State), Ph.D. (Brit. Col.), Associate Professor.
JEAN BARMAN, B.A. (Macalester), A.M. (Harvard), M.L.S. (Calif., Berkeley), Ed.D. (Brit. Col.), Assistant Professor.
DANIEL R. BIRCH, M.A. (Brit. Col.), Ph.D. (Calif., Berkeley), Professor and Vice-President Academic and Provost.
CHARLES J. BRAUNER, A.B. (Michigan), A.M. (Columbia), Ph.D. (Stanford), Professor.
WILLIAM A. BRUNEAU, B.A., M.Ed. (Sask.), Ph.D. (Toronto), Associate Professor.
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JERROLD R. COOMBS, B.S., M.A. (Kent State), Ph.D. (Illinois), Professor.
CHARLES K. CURTIS, B.S. (Abilene), M.A. (Texas), M.Ed. (Brit. Col.), Ed.D (Utah State), Associate Professor.
LEROI B. DANIELS, M.A. (Brit. Col.), Ph.D. (Illinois), Professor and Director, Centre for the Study of Curriculum and Instruction.
VINCENT R. D'OYLEY, B.A. (London), B.Ed., M.Ed., Ed.D. (Toronto), Professor.
FRANK H. ECHOLS, B.S. (Florida), M.A., Ph.D. (Georgia), Assistant Professor.
MURRAY ELLIOTT, B.A., M.A. (Toronto), Ph.D. (London), Associate Professor and Associate Dean.
DONALD FISHER. B.Soc.Sc. (Birmingham), Ph.D. (Calif., Berkeley), 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.
DENNIS MILBURN, M.Sc., M.Phil., Ph.D. (London), Professor.
NANCY M. SHEEHAN, B.A., B.Ed. (Mount Saint Vincent), M.Ed. (Calgary), Ph.D. (Alta.), Professor and Dean.
NEIL SUTHERLAND, M.A. (Brit. Col.), Ph.D. (Minnesota), Professor.
CHARLES UNGERLEIDER, B.A. (San Francisco), M.A. (Columbia), Ed.D. (Massachusetts), Associate Professor and Director of Field Placement and Research.
WALTER WERNER, M.Ed. (Calgary), Ph.D. (Alta.), Associate Professor.
J. DOUGLAS WILLMS, B.Eng. (R.M.C.), M.A. (Brit. Col.), M.Sc., Ph.D. (Stanford), 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.
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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), Associate Professor, Director, Child Study Centre, and Coordinator, Early Childhood Education.
KIT GRAUER, B.Ed., M.A. (Brit. Col.), M.A. (Stanford), Instructor I.
JAMES U. GRAY, Dip. (Vancouver School of Art), B.Ed. (Brit. Col.), M.Ed. (Western Washington), Ph.D. (Washington), Professor.
ALEX McLEOD, M.Ed. (Brit. Col.), Senior Instructor.
ROBERT STEELE, B.A., B.Ed. (Sask.), Associate Professor.

School of Physical Education and Recreation

See separate listing.

PROGRAMS IN THE FACULTY OF EDUCATION

I. Initial teacher education.
II. Continuing teacher education.
III. Graduate programs in education.

For details of application deadlines and fees, please consult the General Information section of this Calendar.

Application forms for admission to Initial and Continuing Teacher Education programs may be obtained from:

Teacher Education Office
Faculty of Education
University of British Columbia
2125 Main Mall
Vancouver, B.C.
V6T 1Z5
Phone: (604) 228-5221
Fax: (604) 228-6501

Application forms for admission to Graduate programs in education may be obtained from the Office of Graduate Programs and Research at the same address, phone (604) 228-5512.

I. INITIAL TEACHER EDUCATION

The initial teacher education program integrates two academic years of pedagogical studies and school experiences. For intending elementary teachers, it presumes completion of at least three years of appropriate post-secondary studies during which the prospective teacher becomes broadly educated and acquires specific knowledge and skills in subject fields appropriate to the elementary school curriculum. For intending secondary teachers, the program builds upon the prior completion of a Bachelor's degree combining breadth of liberal education with depth of study in one or two subjects in the secondary school curriculum.

Within the program, candidates extend their liberal education by exploring educational theory and practice; applying their understanding in carefully graduated teaching practice; and building a foundation for leadership in classroom and community. The program enhances students' abilities to reason well, to communicate effectively, and to share their subject-matter achievements and enthusiasm.

Following completion of all program requirements, candidates are recommended to the University Senate for the Bachelor of Education degree. They normally qualify for the British Columbia Professional Teaching Certificate. (See also section **G** below.)

A. Admission

Secondary school graduates planning a teaching career will seek initial admission to a degree program in an appropriate field other than Education. After completing the general education requirements and teaching subject courses specified below, they will apply for admission to a program of initial teacher education in the Faculty of Education. Up to two years of appropriate university transfer courses may be completed at a B.C. regional college.

The post-secondary preparation of applicants must normally satisfy the following specific requirements:

1. Applicants for the elementary teaching program

While it is recommended that applicants have a Bachelor's degree from another Faculty, applicants will be eligible for admission with a minimum of 45 units of university credit, normally in subject fields within the Faculties of Arts or Science or the School of Physical Education. Subject to the regulations of the Faculty in which the applicant was registered, up to 3 of these units may be in educational theory and practice.

Pre-admission studies must include:

a. English 100 or Arts One (or equivalent). Graduates who have not taken an English course may be admitted subject to either passing an English 100 exemption test or completing English 100 before advancing to Year 2.
b. At least 1.5 (preferably 3) of the 45 units must be in each of a laboratory science, mathematics, and social studies (geography or history). Laboratory science courses are normally selected from the life sciences, chemistry, physical geography, geology, or physics.
c. 9 units at the senior level (normally courses numbered 300 or higher) in one subject area included in the B.C. elementary school curriculum (art, drama, language arts [English and French], mathematics, music, physical education, science, and social studies).
d. An overall average of 65% on either (1) the best 30 units (including the 9 senior units) or (2) the 15 senior units of an acceptable major.

2. Applicants for the secondary teaching program

A Bachelor's degree, normally in subject fields within the Faculties of Arts, Commerce and Business Administration, or Science or the School of Physical Education, or in other fields as specified for the teaching subjects. Subject to the regulations of the Faculty in which the applicant was registered, up to 3 units may be in educational theory and practice.

Prospective teachers of industrial education should consult section **C.3.** below for admission and program requirements.

Pre-admission studies must include:

a. English 100 or Arts One (or equivalent). Graduates who have not taken an English course may be admitted subject to either passing an English 100 exemption test or completing English 100 before qualifying for a teaching certificate.
b. Either
(1) one teaching major and one teaching concentration,
(2) two teaching concentrations, or
(3) one teaching major.
At least one teaching field must be a subject widely taught in B.C. secondary schools.
Applicants should consult section **H** below for information concerning the junior and senior courses for acceptable secondary teaching majors and concentrations and for a list of subjects widely taught in B.C. secondary schools.
c. An average of 65% on the senior courses, normally numbered 300 and above, required for each teaching field.

3. Recommendations for all applicants

a. Because only a limited number of applicants can be admitted in any year, admission may be competitive and some applicants who satisfy the minimum requirements may not be admitted.
b. Preference is given to applicants whose records show broader post-secondary studies, more extensive subject preparation, and higher grades than the minimum specified.
c. Applicants for the secondary teaching program are strongly advised to complete subject-matter preparation for two or more teaching fields.
d. A second-level course in English composition or writing such as English 303 or 304 or Creative Writing 301 is highly desirable for all prospective teachers. Preference is given to applicants who have completed such a course.
e. Preference is given to applicants who have included within their post-secondary studies an introductory course on issues in educational theory and practice.
f. All applicants, and especially applicants to the elementary teaching program, are encouraged to include in their pre-admission studies at least 3 units with a significantly Canadian content or approach. (The Canadian Studies entry in the Faculty of Arts section of this Calendar includes a list of some such courses.)
g. Prospective applicants are encouraged to obtain, as an aid to confirming their career choice, volunteer or other experience in working with young people of the age range they are proposing to teach.
h. Prospective applicants are reminded that they are subject to all requirements and regulations of their registration Faculty. It is especially important for students anticipating admission to the elementary teaching program prior to graduation to satisfy all requirements of their registration Faculty as they proceed so that they will be in the best position to complete the remaining requirements for that degree. Individuals wishing to qualify for such degrees as second degrees following their teacher preparation program will be subject, of course, to the regulations governing the degrees sought at the time of readmission to those programs; attendance at a regular winter session may be necessary, depending on the degree and the major.

4. Selection of candidates

The selection of candidates for admission will be by majority vote of an Admissions Committee which represents both academic and professional interests of the Faculty. Consideration will be given to all applicants who satisfy the minimum admission requirements. In addition,

a. Each applicant must submit for the consideration of the Committee a statement of relevant experience on the appropriate form provided by the Registrar.
b. Each applicant must arrange for the Committee to receive two confidential statements from referees qualified to attest to the applicant's suitability for teaching.
c. An interview may be required as a part of the admissions procedure; applicants, similarly, may request a personal interview. Applicants are responsible for their own expenses in attending admissions interviews.

The Committee will consider such factors as maturity, experience, emotional and physical characteristics relevant to the demands of the program, and writing and speaking abilities. Expressed motivation and demonstrated interest in a teaching career will also be taken into account.

B. The Elementary Teaching Program

The elementary teaching program allows candidates to focus their preparation on either Early Childhood (Kindergarten - Grade 3) or Middle Childhood (Grades 4-7). The program extends over two academic years of two terms each. Courses and associated school experiences must be completed in the specified sequence.

After completing all program requirements, candidates are awarded the Bachelor of Education (Elementary) degree and are normally eligible for the British Columbia Professional Teaching Certificate.

Year 1, term 1

Prospective teachers are introduced to the theoretical bases of modern educational practice. Studies include analysis of the nature and objectives of education and of the developmental characteristics of learners. Attention is given to candidates' own interpersonal and communication skills and to strategies and methods of teaching. Structured classroom observations and teaching experiences (such as tutoring, peer teaching, and microteaching) are provided.

Year 1, term 2

This term includes an intensive two-week school placement in which candidates consolidate their understanding of the first term principles and approaches. This classroom experience provides a basis for further studies of ways of organizing knowledge for instruction and of methods and strategies for teaching. Elementary candidates will prepare to teach all subjects at specific grade levels.

Year 2, term 1

Candidates spend this term in selected B.C. elementary schools. Each candidate works closely with a team of experienced teachers who have been specially prepared for this supervisory and instructional responsibility. Faculty support, advice, and assessment are provided on a regular basis.

Year 2, term 2

Following completion of the extended practicum, candidates undertake professional studies to put their teaching competence in a more comprehensive framework of knowledge and understanding. The term includes elective or prescribed studies appropriate to each candidate's personal academic and professional interests.

1. The basic program

Year 1, term 1

Education 310 (Principles of Teaching: Elementary)	3.0 units
Reading Education 310 (Introduction to Elementary Reading and Language Arts Instruction)	1.5 units
Education 315 (Pre-Practicum Experience)	0.0 units
Education 316 (Communication Skills in Teaching)	1.5 units
Educational Psychology and Special Education 313 (Educational Application of Developmental Theories)	1.5 units
Educational Psychology and Special Education elective	
One of:	
Educational Psychology and Special Education 322 (Education during the Early Childhood Years)	1.0 unit
Educational Psychology and Special Education 323 (Education during the Middle Childhood Years)	1.0 unit
Educational Studies 314 (Analysis of Education)	1.5 units

Year 1, term 2

Education 321 (Orientation School Experience: Elementary)	0.0 units
Curriculum and Instruction Courses	
Art Education 320	1.0 unit
Education 320 (Physical Education)	1.0 unit
English Education 320	1.0 unit
Mathematics Education 320	1.0 unit
Music Education 320	1.0 unit
Reading Education 320	1.0 unit
Science Education 320	1.0 unit
Social Studies Education 320	1.0 unit

Year 2, term 1

Education 418 (Extended Practicum: Elementary)	9.0 units

Year 2, term 2

Education 420 (School Organization in its Social Context)	1.0 unit
Educational Psychology and Special Education 423 (Learning, Measurement, and Teaching)	1.5 units
Educational Studies elective	
One of:	
Educational Studies 425 (Educational Anthropology)	1.5 units
Educational Studies 426 (History of Education)	1.5 units
Educational Studies 427 (Philosophy of Education)	1.5 units
Educational Studies 428 (The Social Foundations of Education)	1.5 units
Educational Studies 429 (Educational Sociology)	1.5 units
Academic, Curriculum, and Professional Electives (Courses selected in consultation with an adviser; candidates who wish to complete a teaching concentration in an elementary school field should select 6 units of courses related to their pre-admission subject specialization.)	4.5 - 6.0 units
Total program requirements	**35.5 - 37.0 units**

2. Le programme en langue française

Ce programme forme des enseignants pour les écoles élémentaires d'enseignement immersif ou de langue maternelle (programme cadre).

Les conditions et le processus d'admission sont en principe les mêmes que pour tout étudiant qui se présente au programme de formation élémentaire. De plus, le candidat au programme aura complété un cours de langue et un cours de littérature de deuxième année et aura réussi à un examen de français parlé et écrit avant d'être admis.

Les programmes français et anglais sont fournis de cours parallèles. Plusieurs cours de base sont assortis de sections réservées à l'enseignement en français. Les éléments facultatifs du programme français sont offerts soit par le département de français soit par le département de didactique des langues. La formation se complète de stages prolongés avec des classes d'enseignement bilingue ou français.

Les candidats sont sujets à toutes les exigences d'anglais du programme de base et doivent faire une partie du stage prolongé dans une classe anglaise.

3. The special education program

This program parallels the basic elementary teaching program in preparing candidates to teach in regular classrooms. In addition it provides the specialized preparation necessary to educate mildly handicapped students (mildly intellectually impaired, behaviourally disordered, and learning disabled) either within regular classrooms or in special education settings.

The same admission requirements and procedures apply as for other applicants to the elementary teaching program, except that applicants to the Special Education program must have completed Educational Psychology and Special Education 312 *Introduction to the study of exceptional children* (or equivalent) prior to admission to the program. If this course has not been included during the applicant's prior university studies, admission may be conditional upon completing the course before commencing Year 1 studies (e.g., during Summer Session).

The sequence of courses is similar to that for the basic elementary teaching program except as noted below. In addition, attention is paid to school placements throughout the program to ensure an orderly progression of experience in working with both regular and exceptional students.

Year 1, term 1

Instead of Education 316 candidates take both of:

Education 317 (Communication with Exceptional Students)	1.5 units
Educational Psychology and Special Education 429 (Education of the Mildly Intellectually Impaired)	1.5 units

Year 1, term 2

Candidates take only one of Art Education 320, Education 320 (Physical Education), and Music Education 320; instead of the two not selected, they take both of:

Educational Psychology and Special Education 316 (Specific Learning Disabilities)	1.5 units
Educational Psychology and Special Education 436 (Behaviour Disorders in Children)	1.5 units

Year 2, term 1

For candidates in the Special Education program, the extended practicum includes assignments to both a classroom and a learning assistance centre.

Year 2, term 2

Instead of Educational Psychology and Special Education 423, candidates take:

Educational Psychology and Special Education 421 (Assesment of Learning Difficulties)	1.5 units

As their "Academic, Curriculum, and Professional Electives," candidates take:

Educational Psychology and Special Education 431 (Programming for Children with Specific Learning Disabilities)	1.5 units
Educational Psychology and Special Education 437 (Teaching Maladjusted Children)	1.5 units
Elective from Educational Psycholgy and Special Education or a related field	1.5 units
Total program requirements:	**38.0 units**

4. The Native Indian teacher education program

This program is directed to persons of native Indian ancestry. It is designed to build upon the personal and cultural resources shared by native Indian persons, and to prepare them for teaching positions in B.C. elementary schools.

NITEP includes similar requirements for both liberal education and pedagogical preparation to those set for other candidates for elementary teaching. The course sequence, however, is different. Applicants who qualify for basic university admission, complete two years of courses at one of the NITEP field centres where the program consists of arts and science courses blended with pedagogical courses and structured school experiences. To satisfy remaining degree requirements, candidates attend at the UBC campus.

NITEP candidates will be eligible for the B.C. Standard Teaching Certificate after completing all requirements listed below for Years 1-4. They will qualify for the Bachelor of Education (Elementary) degree and the B.C. Professional Teaching Certificate after completing all prescribed courses and achieving an average of at least 65% on their best 30 units of courses taken in Arts and Science fields, including the 9 senior units.

To qualify for the degree a candidate must complete all requirements within 10 years of initial registration.

Years 1 and 2

Education 140 (Introduction to Native Indian Studies)	1.5 units
Education 141 (Cultural Studies)	1.5 units
Education 143 (Seminar and School Observation)	0.0 units
Education 240 (Issues in Native Indian Education)	1.5 units
Education 244 (Seminar and Classroom Observation)	0.0 units
Education 316 (Communication Skills in Teaching)	1.5 units
Educational Psychology and Special Education 313 (Educational Application of Developmental Theories)	1.5 units
Educational Studies 314 (Analysis of Education)	1.5 units
English 100 or equivalent	3.0 units
English composition or writing	3.0 units
Elective courses from the Faculties of Arts or Science or the School of Physical Education	15.0 units

Year 3

Education 310 (Principles of Teaching: Elementary)	3.0 units
Reading Education 310 (Introduction to Elementary Reading and Language Arts Instruction)	1.5 units
Education 315 (Pre-practicum Experience)	0.0 units
Educational Psychology and Special Education elective	
One of:	
Educational Psychology and Special Education 322 (Education during the Early Childhood Years)	1.0 unit
Educational Psychology and Special Education 323 (Education during the Middle Childhood Years)	1.0 unit
Curriculum and Instructional Studies 396 (Curriculum Development and Evaluation)	1.5 units
Education 345 (Native Curriculum Field Experience)	0.0 units
Arts or Science elective courses (Including courses in laboratory science, mathematics, and social studies [geography or history] if not completed previously)	9.0 units

Year 4

Curriculum and Instruction Courses	
Art Education 320	1.0 unit
Education 320 (Physical Education)	1.0 unit
English Education 320	1.0 unit
Mathematics Education 320	1.0 unit
Music Education 320	1.0 unit
Reading Education 320	1.0 unit
Science Education 320	1.0 unit
Social Studies Education 320	1.0 unit
Education 321 (Orientation School Experience: Elementary)	0.0 units
Education 418 (Extended Practicum: Elementary)	9.0 units

Year 5

Education 420 (School Organization in its Social Context)	1.0 unit
Educational Psychology and Special Education 423 (Learning, Measurement, and Teaching)	1.5 units
Educational Studies elective	
One of:	
Educational Studies 425 (Educational Anthropology)	1.5 units
Educational Studies 426 (History of Education)	1.5 units
Educational Studies 427 (Philosophy of Education)	1.5 units
Educational Studies 428 (The Social Foundations of Education)	1.5 units
Educational Studies 429 (Educational Sociology)	1.5 units
Arts and science electives (Senior courses in one subject field included in the B.C. elementary school curriculum)	9.0 units
Arts and Science elective (Junior or senior)	1.5 units
Academic, Curriculum, and Professional Electives (Courses selected in consultation with an advisor)	3.0 - 4.5 units
Total program requirements	**80.5 - 82.0 units**

C. The Secondary Teaching Program

The secondary teaching program enables candidates to prepare to teach one or two subjects, depending on their prior background, at the secondary grade levels (Grades 8-12).

The total program includes the equivalent of two full academic years of courses and student teaching. The first three terms of the program are scheduled within a 12-month period, beginning in September and concluding in mid-August, thus enabling candidates to qualify for a teaching certificate within one calendar year. Degree completion courses are taken during a subsequent summer session or extra-sessionally, depending on course availability.

After completing all courses listed for Terms 1-3, candidates are eligible for a B.C. Professional Teaching Certificate. Candidates are awarded the Bachelor of Education (Secondary) degree when they have completed all program requirements.

Term 1 (September - December)

Prospective teachers are introduced to the theoretical bases of modern educational practice and to strategies and methods of teaching, both in general and in relation to the subject(s) they are preparing to teach. Studies include analysis of the nature and objectives of education and of the developmental characteristics of adolescent learners. Structured classroom observations and teaching experiences (such as tutoring, peer teaching, and microteaching) are provided.

Term 2 (January - April)

This term begins with an intensive two-week communications course in which attention is given to the candidate's own interpersonal and communication skills in relation to the demands of the secondary classroom. The remainder of the term is spent in a selected B.C. secondary school where the candidate works with a team of experienced teachers who have been specially prepared for this supervisory and instructional responsibility. Faculty support, advice, and assessment are provided on a regular basis.

Term 3 (May - August)

Following completion of the extended practicum, candidates return to the campus for studies designed to put their teaching competence in a more comprehensive framework of knowledge and understanding. An opportunity is provided for them to enhance their subject-matter and/or pedagogical competence.

Degree completion studies

This final phase of the program is ordinarily completed as the first phase of the beginning teacher's personal program of continuing professional education. In consultation with an adviser, candidates select courses which complement their initial preparation and which further their personal and professional interests. Such courses must be completed within four years of initial registration in the program.

1. The basic program

Term 1 (September - December)

Education 311 (Principles of Teaching: Secondary)	3.0 units
Education 315 (Pre-Practicum Experience)	0.0 units
Education 319 (Orientation School Experience: Secondary)	0.0 units
Educational Psychology and Special Education 306 (Education during the Adolescent Years)	1.5 units
Educational Studies 314 (The Analysis of Education)	1.5 units
Curriculum and Instruction Courses	
Course(s) related to first teaching subject	2.0 units
Course(s) related to second teaching subject (Candidates preparing to teach only one subject will instead take 1.5 - 2.0 units of additional courses related to that subject)	1.0 - 2.0 units

Term 2 (January - April)

Education 316 (Communication Skills in Teaching)	1.5 units
Education 329 (Extended Practicum: Secondary)	9.0 units

Term 3 (May - August)

Education 420 (School Organization in its Social Context)	1.0 unit
Educational Psychology and Special Education 423 (Learning, Measurement, and Teaching)	1.5 units
Educational Studies elective	
One of:	
Educational Studies 425 (Educational Anthropology)	1.5 units
Educational Studies 426 (History of Education)	1.5 units
Educational Studies 427 (Philosophy of Education)	1.5 units
Educational Studies 428 (The Social Foundations of Education)	1.5 units
Educational Studies 429 (Educational Sociology)	1.5 units
English Education 426 (Language Across the Curriculum: Secondary)	2.0 units
Elective or prescribed courses related to teaching major or concentration (Courses selected in consultation with an adviser; candidates admitted without both a teaching major and a teaching concentration may be required to strengthen their subject background.)	4.5 units

Degree completion courses

Educational Psychology elective	1.5 units
Academic, Curriculum, or Professional Electives	3.0 units
Total degree requirements	**34.5 - 35.5 units**

2. Le programme en langue française

Ce programme forme des enseignants à enseigner une ou deux matières à l'école secondaire en immersion ou au programme cadre (français langue maternelle).

Les conditions et le processus d'admission sont en principe les mêmes que pour ceux qui se présentent au programme de formation secondaire. De plus, le candidat au programme aura complété un cours de langue et un cours de littérature de deuxième année et aura réussi à l'examen de français parlé et écrit avant d'être admis. Les postulants pourront choisir le français comme matière d'enseignement mais ils devront en plus choisir au moins une autre matière d'enseignement (autres langues exclues).

Les programmes français et anglais sont fournis de cours parallèles. Plusieurs cours de base sont assortis de sections réservées à l'enseignement en français. Les éléments facultatifs du programme français sont offerts soit par le département de français soit par le département de didactique des langues. La formation se complète de stages prolongés avec des classes d'enseignement bilingue ou français.

Les candidats sont sujets à toutes les exigences d'anglais du programme de base et doivent faire une partie de leur stage prolongé dans une classe anglaise.

3. The industrial education programs

The Faculty of Education, in cooperation with the British Columbia Institute of Technology, offers programs to prepare secondary school industrial education teachers. The full post-secondary preparation for teachers of industrial education consists of the equivalent of five academic years (80.0-80.5 units) of liberal, technical, and professional courses and school experiences.

The liberal studies component includes English 100 and 12 units of electives from the Faculties of Arts and Science. The technical component includes the 30 units of courses detailed in section **H.(6)** below. In addition to these components, industrial education candidates complete the same 35.0-35.5 unit basic Secondary Teaching Program prescribed for candidates in other teaching subjects and described in section **C.1.** above.

Prospective industrial education teachers with limited or no related occupational experience follow the *General Program*. They complete all liberal and technical requirements before admission to the UBC program of teacher education.

Applicants with approved occupational competence and experience may qualify for an *Accelerated Program*. They may seek admission to the UBC program of initial teacher education after completing English 100 and 21 units of recognized technical studies. Such candidates must complete the remaining 12 units of liberal studies and 9 units of advanced technical requirements before registering for any of the "Degree completion courses" of their B.Ed. program.

Industrial education candidates normally qualify for the B.C. Standard Teaching Certificate upon completion of all requirements of Terms 1, 2, and 3 of the Secondary Teaching Program. Upon completion of the full program requirements, they qualify for the B.Ed. (Secondary) degree and the B.C. Professional Teaching Certificate.

Liberal studies courses may be completed while registered in another faculty or university or at a regional college in B.C. or elsewhere. Technical studies are normally completed at the British Columbia Institute of Technology. Those who wish to prepare as industrial education teachers after completing a first degree in another field normally satisfy the liberal studies requirements during their undergraduate programs; if their first degrees satisfy the requirements for a teaching concentration or major in a subject other than industrial education, these candidates may prepare to teach both industrial education and that second subject.

4. The special education program

This variant on the basic secondary teaching program prepares candidates to teach their subject(s) to mildly handicapped students (mildly intellectually impaired, behaviourally disordered, and learning disabled).

The same admission requirements and procedures apply as for other applicants to the secondary teaching program, except that applicants must have completed 6 units of Educational Psychology and Special Education courses prior to beginning the program of studies. These courses are:

a. Educational Psychology and Special Education 312 or 317	1.5 units
b. Educational Psychology and Special Education 316	1.5 units
c. Educational Psychology and Special Education 420 or 429	1.5 units
d. Educational Psychology and Special Education 431	1.5 units

If these courses have not been included during an applicant's first degree studies, admission may be to the basic secondary teaching program with a recommendation for transfer to the special education program conditional upon the candidate completing these courses before initial registration (e.g., during summer session).

The sequence of courses is the same as for the basic secondary teaching program, with the exceptions noted below. Where warranted, special sections of courses are scheduled. In addition, attention is paid to school placements throughout the program to ensure an orderly progression of experience in working with both regular and exceptional students.

Term 1

Same as the basic program.

Term 2

Education 317 instead of 316.
(Communication with Exceptional Students)

Education 329, Extended Practicum: Secondary, will include an assignment to a class including students with special educational needs and a placement in a learning assistance centre for a significant portion of the term. Substantial experience in regular classrooms will also be scheduled.

Term 3

Educational Psychology and Special Education 461 — 1.5 units
(Educational Diagnosis and Remedial Instruction)
This course replaces 1.5 units of the elective or prescribed courses related to the teaching major or concentration. The other 3.0 units of this requirement are satisfied by Educational Psychology and Special Education 420 (or 429) and 431, provided these courses were not used as credit towards another degree or diploma. Candidates who took these courses for credit within another program will take 3.0 units of courses on the same basis as candidates in the basic program.

Degree completion courses

Educational Psychology and Special Education 436 — 1.5 units
(Behaviour Disorders in Children)

Educational Psychology and Special Education electives — 3.0 units
(Selected from Educational Psychology and Special Education 303, 314, 318, 342, 343, 344, 345, 347, 348, 390, 403, 418, 426, 434, 437; English Education 337; Mathematics Education 471; Music Education 412; Physical Education 362, 467; Reading Education 475.)

Total program requirements — 35.0 - 35.5 units

D. 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 the Faculty of Education.

1. English composition requirement

All candidates admitted to the Initial Teacher Education program must pass the English Composition Test. Those who have not passed it prior to admission will write the test at its first available sitting after their initial registration and must pass it before they will be permitted to begin the Extended Practicum (Education 418 or Education 329).

Candidates who anticipate difficulty passing the test are advised to enroll in a remedial English course in the Centre for Continuing Education. Candidates in the secondary teaching program are encouraged to sit the test in July prior to beginning the program.

2. Oral English requirement

All candidates admitted to the Initial Teacher Education program must pass the Test of Competence in Oral English. The Test is administered by the Faculty during September. Candidates 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 they will be required:

a. to undertake a program of remedial work in spoken English and/or to obtain further language counselling, or
b. 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 of all candidates in the program.

Candidates will not be permitted to begin the Extended Practicum (Education 418 or Education 329) until they have passed this test.

3. Advancement

A candidate must normally have passed all courses prescribed for the term or terms prior to the Extended Practicum before advancing to this part of the program.

Similarly, a candidate must have completed the Extended Practicum before taking any courses scheduled for the term or terms following it.

The record of each candidate on the Elementary Teaching Program is reviewed by the Faculty Promotion Committee at the conclusion of the first year to determine eligibility for promotion to Year 2 and at the end of second year to determine eligibility for graduation and teacher certification.

The record of each candidate on the Secondary Teaching Program is reviewed by the Faculty Promotion Committee at the conclusion of Term 1 to determine eligibility for the Extended Practicum, at the conclusion of Term 3 to determine eligibility for teacher certification, and at the conclusion of the program to determine degree eligibility.

A candidate whose academic standing is unsatisfactory may be required either to withdraw from the Faculty or to repeat some or all of the work of the term or terms under review.

4. Teaching Practica

Half-day practicum placements are in schools within Vancouver and nearby districts so that candidates may return to campus for afternoon classes. Two- and thirteen-week placements are in Lower Mainland school districts and in selected locations throughout the province.

The availability of placements in some areas may be limited and candidates must be prepared to accept placement for the two- and thirteen-week practica anywhere within 125 km of the UBC campus. Candidates make their own arrangements for and bear the cost of personal transportation and accommodation during practica.

All teaching practica will be graded as either **C** (completed satisfactorily) or **F** (failed to complete satisfactorily). [See also below regarding Supplemental Practica and Withdrawal from Practica.]

5. Supplemental examinations

In any session a candidate may be granted the privilege of writing supplemental examinations in not more than 3 units of courses provided that the candidate

a. wrote the scheduled final examination and achieved an overall grade of at least 40% in the course in question, and
b. achieved credit in at least 60% of a course load of over 6 units or in at least 50% of a course load of 6 or fewer units.

The Promotions Committee, at its discretion, may grant supplemental privileges in a further 3 units to a candidate whose course load during a regular winter session is in excess of 15 units.

The Committee may also prescribe a supplemental Practicum, not to exceed 6 weeks, for candidates who at the conclusion of the Extended Practicum have made significant progress but who have not attained the required standard of teaching performance.

For the secondary teaching program, supplemental examinations for Term 1 courses will be scheduled during the first week of Term 2.

6. Withdrawal and readmission

Candidates who begin the Extended Practicum (Education 329, 418, 495, or 496) are not permitted to drop this course from their records. Those who do not complete the practicum satisfactorily, and who qualify for neither a supplemental practicum (see 5. above) nor a deferred practicum (see "Deferred Examination" in the General Information section) will be assigned a failing grade and will normally be required to discontinue or to withdraw from the program.

After one year, candidates required to discontinue may appeal to the Faculty for permission to re-enrol. Their appeal must include evidence of their having satisfied any conditions set at the time they were required to discontinue.

Those required to withdraw are not normally readmitted to a teacher education program. In exceptional circumstances a candidate may, after at least one year, submit a formal appeal for permission to re-enrol. Such an appeal will be granted only after review by the Dean and approval by the Senate Admissions Committee.

Candidates who withdraw from the program voluntarily will not be entitled automatically to return; each request for reinstatement will be considered by the Faculty Admission Committee along with other applications at the time.

Candidates who for any reason fail to complete all requirements of the program within a four year period will not be allowed readmission; they may, however, submit new applications for admission and, if admitted, will receive no advance credit for courses completed previously.

7. Part-time students

Because of the tightly-integrated character of the program candidates are normally expected to pursue studies on a full-time basis until all requirements are satisfied.

A limited number of candidates may be admitted to undertake Year 1 of the elementary teaching program on a part-time basis over two academic years. The Extended Practicum (Year 2, Term 1) must then be completed on a full-time basis. A candidate who has completed three terms of the elementary teaching program or two terms of the secondary teaching program may seek the Appeals Committee's permission to complete the balance of the program on a part-time basis. Such a request will be granted only if an acceptable plan for program completion is presented; completion must be within 4 years of initial registration.

8. Advance credit

Except as provided in section **F** below, credit may not normally be transferred from other institutions for courses prescribed for the first three terms of the elementary teaching program or for the first two terms of the secondary teaching program. In special circumstances students may be granted permission to complete some or all of the courses prescribed for the final term at another institution if (a) permission is sought in advance, (b) the courses to be transferred are taken after all requirements of preceding terms have been satisfied, and (c) these courses are appropriate to the candidate's UBC program.

9. Academic appeal

An appeal, in general, falls into one of two categories:

a. request for review of the standing assigned in a course, or
b. protest of a decision relating to academic studies.

For information concerning the procedures for initiating either of these, a candidate should consult the General Academic Regulations in the General Information section of this Calendar under the headings 'Review of Assigned Standing' and 'Appeal Procedure.'

In the Faculty of Education appeals to the Dean related to Initial and Continuing Teacher Education should be addressed in the first instance to the Associate Dean (Teacher Education) for consideration, as warranted, by the Teacher Education Appeals Committee.

E. Prior Programs

1. Students admitted to the previous B.Ed. (Elementary, Secondary, or Special Education) degree programs and to the previous teacher education programs for graduates of other faculties should consult the 1986-87 Calendar for the most recent requirements for these programs.
2. To qualify for
   (1) the Bachelor of Education (Elementary),
   (2) the Bachelor of Education (Secondary), or
   (3) the Bachelor of Education (Special Education)
   according to the previous regulations, a candidate must have completed all degree requirements by 31 August 1993. Degrees will not be conferred on the basis of the prior requirements after this date.
3. Students previously admitted to the programs of teacher education for graduates of other faculties must have completed all requirements of their programs by 31 August 1990.
4. Because the resources of the University do not permit all courses for the above programs to be maintained until these dates, students' elective choices may be reduced and substitutions for program requirements may be necessary.

F. Programs for candidates holding teaching certificates

1. Individuals who qualified for teaching certificates in B.C. or elsewhere and whose certificates have lapsed should make application for admission to the initial teacher education program as new students. The normal admission requirements will apply. Advance credit will not normally be granted.
2. Individuals who hold valid B.C. teaching certificates awarded either
   a. on the basis of initial pedagogical preparation completed during the previous 6 years, or
   b. on the basis of initial pedagogical preparation completed during the previous 10 years and who have taught on a full-time basis for any 4 of the most recent 6 years (of which at least 2 must have been within B.C.)
   may apply for admission to the Initial Teacher Education program with advance credit. All normal admission requirements will apply. The admission committee may grant a maximum of 18 units of credit for professional pedagogical studies and school experience and may specify some variance from the normal program requirements as warranted by the nature and extent of the prior preparation and experience.
3. Persons who have a program of 9 or fewer units of pedagogical courses prescribed as a condition of qualifying for a Professional teaching certificate may be admitted as occasional students (see below). If student teaching is prescribed, they must have completed equivalent pedagogical preparation to that prescribed prior to the Extended Practicum before beginning the practicum portion of their program.

G. Licensing Agencies and Professional Associations

Students preparing to enter the teaching profession should inform themselves concerning teacher certification levels and teacher qualification levels.

1. Certificate of Qualification (Teacher Certification)

Possession of a certificate of qualification to teach is mandatory for teaching within the public elementary or secondary schools of British Columbia. The *Teaching Profession Act* has assigned the authority to issue teaching certificates and to determine the grades or classes of certificates of qualification issued to the British Columbia College of Teachers.

Current information concerning the membership and certification requirements of the College can be obtained by writing directly to the British Columbia College of Teachers, 405-1385 West Eighth Avenue, Vancouver, B.C., V6H 3V9 (telephone: 731-8170). Information will also be available from the Teacher Education Office, Faculty of Education, Scarfe 103.

Superintendents' Listing

The Faculty 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 candidates' permanent records are not forwarded with this report. Those wishing to be excluded from this report should inform the Associate Dean (Teacher Education), Faculty of Education, in writing before January 15.

Other Considerations

Persons convicted of a criminal offence and considering a teaching career, should write the Registrar, College of Teachers 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.

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 preparation acceptable to the Teacher Qualification Board. One of the years must be a professional year.

"Request for evaluation" forms are available from the Teacher Education Office, Faculty of Education and from the Teacher Qualification Service office at: 402-1195 West Broadway, Vancouver, B.C., V6H 4A8 (telephone: 736-5484).

3. Professional Association

Under current legislation, teachers of the province automatically become members of the College of Teachers. The *Teaching Profession Act* also provides for a teachers' association within each school district with responsibility to negotiate on behalf of all teachers in the district an agreement respecting the terms and conditions of employment of those teachers.

The British Columbia Teachers' Federation, 2235 Burrard Street, Vancouver V6J 3H9 (telephone: 731-8121), is the teachers' provincial professional organization to which district associations belong. Publications of the B.C.T.F. are provided to candidates in teacher education programs on request for a nominal fee; they carry useful articles on teaching practices and on other matters of professional interest. In the spring, the B.C.T.F. can provide current salary scales for all school districts in the province.

H. Secondary Teaching Field Requirements

In the following list of secondary teaching fields, 'C' indicates that the subject may be presented as a teaching **concentration** and 'M' that it may be presented as a teaching **major**. Because certain subjects are not widely taught in B.C. secondary schools, candidates preparing to teach a subject marked '*' must also prepare to teach at least one not so marked.

Agricultural Sciences * C	Japanese * C
Art C M	Mathematics C M
Biological Sciences C M	Music M
Business Education C M	Physical Education C M
Chemistry C M	Physics C M
Chinese * C	Russian * C
Computer Science C M	Social Studies (Emphasis on Geography) C M
Earth and Space Science C M	Social Studies (Emphasis on History) C M
English C M	Social Studies (Emphasis on Social Sciences) * C
French C M	Spanish * C
German * C	Theatre * C
Home Economics C M	
Industrial Education M	
Italian * C	

The teaching field requirements for admission to the B.Ed. (Secondary) are listed below. A teaching *concentration* normally consists of 9 units of senior courses (numbered 300 or higher and taken in years 3 and 4) in addition to specified junior courses (numbered below 300); a teaching *major* normally consists of 15 units of senior courses in addition to specified junior courses. Students preparing for secondary teaching should have completed all junior and senior requirements for their intended teaching field(s) before commencing the teacher education program.

As indicated below, a number of Schools and Departments of the University have designed undergraduate degree programs for prospective secondary teachers; the detailed requirements of such programs are listed in the appropriate School or Department section of this *Calendar*. Graduates of equivalent programs at other recognized universities are, of course, eligible for consideration.

(1) Art Concentration and Major

Concentration:

An introductory survey course in art history and 6 units of introductory studio art; 9 units of senior level art, including at least 6 units of studio art (which may include art education studio offerings).

Major:

B.A. with a major in Studio Arts.

(2) Business Education Concentration and Major

Concentration:

Introductory courses in computer science, economics, and mathematics as a foundation for 9 units of specialized courses in accounting, marketing, commercial law, and management information systems. Applicants who do not have keyboarding and data processing skills will be required to acquire these within the teacher education program.

Major:

An additional 6 units of senior courses in finance, marketing, and management information systems.

(3) Computer Science Concentration and Major

Concentration:

First and second year courses in computer programming, computer structures, and mathematics; 9 units of senior computing courses covering advanced programming, systems design, programming languages, and the impact of computers on society.

Major:

An additional 6 units of elective courses in computer science. Applicants with a major in computer science must also prepare in a second teaching subject.

(4) English Concentration and Major

Concentration:

First and second year English; 12 units of senior English including 3 units from each of: (a) English language, (b) English composition or creative writing, (c) pre-twentieth century literature, and (d) twentieth century literature. Prospective applicants are advised to complete courses in both Shakespeare and Canadian literature.

Major:

An additional 6 units of senior English.

(5) Home Economics Concentration and Major

Concentration:

6 -9 units of introductory courses in home economics and/or family studies; 9 senior units from the areas of family studies **and** either foods and nutrition or textiles and clothing, or a combination of the latter two areas.

Major:

An additional 6 senior units in the above.

(6) Industrial Education Major

Major:

30 units of recognized technical courses, including (a) 3 units from each of design, drafting, electricity, materials technology, metalwork, power mechanics, and woodwork, and (b) 9 units of advanced courses in one or two acceptable technical areas.

Note: The University does not itself offer these technical courses but recognizes certain courses offered by the British Columbia Institute of Technology and by other technical institutes where these meet the transfer standards of the university.

(7) Mathematics Concentration and Major

Concentration:

6-9 units of junior mathematics and 9 units of senior mathematics. The program must include courses in 3 of the following 5 areas: algebra, geometry, number theory, probability and statistics, and computer science.

Major:

An additional 6 units of senior mathematics.

Note: Courses in applied mathematics will be considered.

(8) Modern Languages Concentrations and Major

(Chinese, French, German, Italian, Japanese, Russian, and Spanish)

Concentrations:

First and second year courses in both the language and the literature of the selected language; 9 senior units in the selected language, at least 3 of which must be language study and must be completed with second class or higher standing. Applicants who present a language other than French as one teaching field must present a second teaching field which is *not* one of these languages; French and one such language is an acceptable combination as is English and one such language.

Major in French:

An additional 6 units of senior French.

Note: Candidates will be required to demonstrate oral and written proficiency in their selected language(s) either prior to admission or early in the program.

(9) Music Major

Major:

B.Mus. with a major in General Studies (Secondary Education Stream).

(10) Physical Education Concentration and Major

Concentration:

3 units of approved foundational physical education courses from each of: exercise science, motor performance and control, leisure studies, and performance analysis; 9 units of acceptable senior physical education courses in the areas of instruction and coaching. In addition, applicants must present evidence of competence in aquatics, dance, gymnastics, and at least 4 other performance areas included within the secondary school curriculum.

Major:

An additional 6 units of senior physical education electives. Applicants with a major in physical education must also prepare in a second teaching subject.

(11) Science Concentrations and Majors

(Agricultural science, biological sciences, chemistry, earth and space science, and physics).

Concentrations:

3 units of introductory or survey courses in each of biological sciences, chemistry, mathematics, and physics (an introductory course in geology is also required either prior to admission or within the teacher education program); an additional 3-6 units of junior courses and 9 units of senior courses in the selected science.

The set of courses for each selected science must include both lecture and laboratory studies and satisfy the following:

Agricultural science: Animal science, plant science, and soil science; a half course in agricultural economics is recommended.

Biological sciences: A balanced selection of courses from each of taxa; physiology, cytology, or anatomy; ecology; and genetics.

Chemistry: Organic, inorganic, physical, and analytical chemistry. Biochemistry programs may be suitable.

Earth and space science: A balanced selection of courses from some or all of astronomy, geology, geophysics, oceanography, and/or physical geography.

Physics: Thermodynamics, electricity and magnetism; optics and acoustics; quantum, nuclear, and atomic physics; and mechanics.

Majors:

An additional 6 units of senior courses in the selected science. Applicants are admitted as majors in all science fields listed above *except* agricultural science.

(12) Social Studies Concentrations and Majors

(Emphasis on geography, history, and a social science)

Concentrations:

3 units of introductory or survey courses in each of geography, history, and a social science; a further 3 units of junior courses and 9 units of senior courses in the discipline of emphasis. The total program must include 3 units with a significant Canadian content in the discipline of emphasis.

An applicant's program should satisfy the following conditions for the chosen discipline of emphasis:

Geography: Both physical and cultural geography with courses in regional and environmental studies.

History: Canadian, European, and modern world history.

Social Science: An appropriate grouping of courses within a single, acceptable social science discipline (anthropology, Asian area studies, economics, political science, or sociology).

Note: Applicants may present more than one social studies teaching field. Social science applicants *must* present a second teaching field (either geography, history, or another subject widely taught in B.C. secondary schools).

Majors:

An additional 6 units of senior courses in the discipline of emphasis (geography or history only).

(13) Theatre Concentration

Concentration:

A minimum of 6 units of junior theatre courses and 9 units at the senior level. The total program must cover acting, directing, theatrical production, and history of theatre.

II. CONTINUING TEACHER EDUCATION

A. 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, if desired, can 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. Completion of a diploma program does not satisfy any of the requirements for a B.C. teaching certificate.

3. Residence 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
Canadian Studies
Computing Studies Education
Curriculum and Instructional Studies
Educational Psychology
Educational Studies
**** Education of the Hearing Impaired**
**** Education of the Mentally Handicapped**
**** Education of Visually Impaired Children**
Education of Young Children
English Education
English as a Second Language
French Education
Guidance Studies
Industrial Education
Law-Related Education
Library Education
Mathematics Education
Mathematics and Science Education
Multicultural and Minority Educatlon
Music Education
Physical Education
Primary Education
Reading Education
Science Education
Social Studies (Elementary)
Special Education
Special Education of Infants
Values Education
Visual and Performing Arts in Education

NOTES:

* Some non-graduates may be admitted in this field. Prerequisite: two years' experience in adult education.

** Full-time study during a regular winter session is required. Completion of a program in this field requires extensive practica. Enrollment is limited; interested applicants should apply early as the selection of candidates is normally completed by March 1.

B. Occasional students

Persons not admitted to a degree or diploma program may be admitted to take elective courses for which they satisfy all stated prerequisites. Interested persons should inquire at the Teacher Education Office concerning courses routinely open to them and courses for which departmental approval is required.

C. Non-credit courses and programs

Through its Distance Education Office and in conjunction with School Districts, the Faculty of Education makes non-credit as well as credit professional development programs available to practising teachers. Teachers may inquire of their district professional development coordinator concerning programs being planned; information is also available from the Faculty's Distance Education Office.

III. 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 for graduate programs 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.

THE SCHOOL OF FAMILY AND NUTRITIONAL SCIENCES

(A School within the Faculty of Arts)

ACADEMIC STAFF

Director and Professor

DANIEL PERLMAN, A.B. (Bard College), M.A., Ph.D. (Claremont Graduate School).

Professors

MARGARET ARCUS, B.Sc. (Nebraska), M.Ed. (Utah State), Ph.D. (Iowa State).
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).
ROY H. RODGERS, B.A. (Wheaton College, Illinois), M.A. (North Carolina), Ph.D. (Minnesota).

Associate Professors

JOANNA STANISZKIS, B.F.A. (Art Institute of Chicago), R.C.A.
PHYLLIS J. JOHNSON, B.S., M.S. (Kansas State), Ph.D. (Ohio State).
JAMES WHITE, B.A. (Colorado College), M.A. (Calgary), Ph.D. (Alberta).

Assistant Professors

SUSAN I. BARR, B.H.E. (Brit. Col.), Ph.D. (Minnesota).
PETER J. H. JONES, B.Sc., M.Sc. (Brit. Col.), Ph.D. (Toronto).
LINDA J. McCARGAR, B.H.Ec. (Manitoba), M.Sc., Ph.D. (Alberta).
ELEANORE R. VAINES, B.Sc. (Washington), M.S. (Cornell), Ph.D. (Michigan State).

Senior Instructor

CLARE N. DAEM, B.H.E. (Brit. Col.).

Part-time Lecturers

ARLEE B. GALE, B.H.E. (Brit. Col.), M.S. (Cornell).
VERNA MAGEE SHEPHERD, B.H.E. (Brit. Col.), M.Sc. (Calgary).
CECELIA F. PODOLAK, B.A. (Northern Iowa), M.S. (Oklahoma State).
ROBERTA RICHARDS, B.Sc.H.Ec. (Manitoba), M.Sc.H.Ec. (Minnesota).

Lecturers from other Departments

PETER HAHN, B.Sc. (Swansea), M.D., C.Sc., D.Sc., (Prague), Professor, Dept. of Obstetrics and Gynaecology.
SHEILA M. INNIS, H.N.D. (Grimsby), M.Sc. (Alberta), Ph.D. (Toronto), Assistant Professor, Dept. of Paediatrics.
LEON KRAINTZ, A.B. (Harvard), M.A., Ph.D. (Rice Inst.), Professor Emeritus, Dept. of Oral Biology.

Honorary Lecturer

CHRISTINE SAMSON, B.Sc. (Acadia), R.D.T. (Alberta).

Honorary Clinical Instructors from Affiliated Institutions

Children's Hospital	— Patricia J. Thomson, B.Sc. (Brit. Col.).
St. Paul's Hospital	— Sonia A. Chrysomilides, B.Sc., M.Sc. (Lebanon).
University Hospital	— Verna A. Magee Shepherd, B.H.E. (Brit. Col.), M.Sc. (Calgary).
Vancouver General Hospital	— 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 encourage a spirit of intellectual enquiry and second, to educate for professional competence.

The School offers four undergraduate programs:

— the program in Dietetics leads to the Bachelor of Science in Dietetics (B.Sc.(Dietet.)) degree;
— the Major program in Family Science leads to the Bachelor of Arts (B.A.) degree;
— the program in Home Economics leads to the Bachelor of Home Economics (B.H.E.) degree;
— the Major program in Human Nutrition leads to the Bachelor of Science (B.Sc.) degree in Nutritional Sciences.

The Dietetics program and the Major program in Human Nutrition specialize in the physical and biological sciences. They differ in that the Human Nutrition program provides a basic education in life science whereas the Dietetics program involves greater attention to patient care, administration, and the role of diet in the prevention, etiology and treatment of disease.

The Family Science Major program examines the North American family (and its alternatives) in a multidisciplinary, life-span perspective. Courses focus on courtship and marriage, human development in the family context, and family financial or resources management.

Home Economics is an interdisciplinary field of study concerned with improving the quality of domestic life. Study in this area integrates biological, physical and social sciences, and includes course work in family studies, human development, family resource management, foods and nutrition, and clothing, textile and design, as well as electives from supporting areas. Provision for part-time study in Home Economics may be made by application to the Director of the School.

Professional Opportunities

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 Family Science program may pursue advanced degrees or be employed in government or the private sector in positions related to family research or programs. Graduates of the Home Economics program may be employed in a variety of positions in business and industry (especially in the areas of food, clothing and textiles), and in government agencies and extension services. In this program, graduates choosing one of the Specialization Options in family life are often employed by community agencies and institutions which address the educational or human services needs of children and youth, adults, or the elderly. Graduates of the Comprehensive Option of the program may also, with additional training, be employed in teaching. Graduates of the Human Nutrition 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.

Admission

Only students seeking admission to the Dietetics and Home Economics programs should apply to the University for admission to the School. Students wishing to major in Family Science should apply for admission to the Faculty of Arts and those wishing to major in Human Nutrition in the Nutritional Sciences program should apply for admission to the Faculty of Science. The following information applies, nevertheless, to all students.

British Columbia secondary-school graduates will be considered for admission if they have 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 admission requirements of the various programs described below. 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.

All new applicants are charged an application fee of $15.00 (plus an additional $10.00 if out-of-province documents are submitted). This fee must accompany the application for admission form when submitted with supporting documents. The fee is nonrefundable and is not applicable to tuition.

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.

Admission to the Dietetics (B.Sc.) and Dietetics Qualifying programs is limited. In addition to their regular application to the University, students interested in these programs should write to the Director of the School of Family and Nutritional Sciences to request a Dietetics program application form. This form must be completed and returned to the School by May 15. Students will normally be admitted only to the first or second year of the Dietetics (B.Sc.) program. Admission to these programs is based on completion of prerequisites and applicants' previous year or University entrance grade point average calculated according to the procedures developed by the University's Admissions Office. To be considered for admission, students are required to have a minimum academic standing (minimum achievement) of at least 68% (G.P.A. 2.7).

Academic Regulations

Each program has its own regulations described below. In addition, students should note:

1. The minimum number of units required for all Bachelor's degree programs is 60 units.
2. In their third and fourth years, students in Home Economics (B.H.E.), Dietetics (B.Sc.(Dietet.)) and Family Science (B.A.) must earn at least 24 units in courses numbered 300 or above; students in Nutritional Sciences (B.Sc.) must complete at least 21 units in courses numbered 300 or above.
3. For students in the Home Economics (B.H.E.) program, a minimum total of 24 units is required of courses in Family and Nutritional Sciences (FMSC, HMEC, or HUNU).
4. In Dietetics and Home Economics, the determination of students' standing as Satisfactory or Unsatisfactory, and of their eligibility to take Supplemental Examinations follows the regulations of the Faculty of Arts.
5. To qualify for an undergraduate degree, all students must satisfy the 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 are generally expected to pass the ECT before registering for their last 30 units. **Students who have not passed the Test by the time they have completed 45 units towards their degree may not re-register in the School or the Faculty of Arts until the requirement has been satisfied.** Students should be aware that if they have not passed the ECT and are preparing to register in a program which includes units beyond their 45th, they will be limited in their registration to that number of units which brings their total to 45. Students who anticipate difficulty passing the Test are advised to enrol in a remedial English course at the Centre for Continuing Education.

FAMILY SCIENCE PROGRAM (B.A.)

The Family Science Major is an academic program open to students registered in the Faculty of Arts. Students should consult the **Faculty of Arts** section of the *Calendar* for the general Faculty requirements and regulations pertaining to the Major.

Requirements for the degree of Bachelor of Arts:

Major

First and Second Years:
Family Science 200
Statistics 203

Third and Fourth Years:
Family Science 420
Family Science 422
At least 12 additional units of Family Science courses including:
— at least one of: 320, 322, 324, 326, 436
— at least one of: 312, 314, 316, 410, 414
— at least one of: 338, 340, 342, 440, 442

HOME ECONOMICS PROGRAM (B.H.E.)

The program in Home Economics is designed to provide academic preparation for students interested in pursuing a variety of Home Economics related careers. Those intending to pursue secondary school teaching in Home Economics should enrol in the **Comprehensive Option**. Those who wish to pursue a more specialized program should enrol in either the Family Life Education or Family Consumer Services **Specialization Option**. Information concerning careers in Home Economics may be obtained on request from the School of Family and Nutritional Sciences.

Admission Requirements:

See *Admission to the University* in the General Information section of the *Calendar*.

Required: Algebra 12.

Recommended: Biology 11, Chemistry 12 and as many Home Economics courses at the grades 11 and 12 levels as possible.

Comprehensive Option

First and Second Year	*Units*	*Third and Fourth Year*	*Units*
Chemistry 103	3	HUNU 201	3
Biology 101, 102 or 103	3	HUNU 205	1½
Economics 100	3	HUNU 209	1½
English 100	3	HMEC 300	1½
HMEC 100	1½	HMEC 352	1½
FMSC 200	3	HMEC 354	1½
*Social Science elective	4½	HMEC 360	1½
*Electives	9	FMSC 320	1½
	30	FMSC 338	1½
		FMSC 364	1½
		*FMSC or HMEC electives	3
		*Electives	10½
			30

Specialization Option

First and Second Year	*Units*	*Third and Fourth Years*	*Units*
Economics 100	3	HMEC 300	1½
English 100	3	**Specialization Requirements	16½
HMEC 100	1½	*Electives	12
FMSC 200	3		30
**Science requirement (see Specialization Requirement)	3-6		
*Social Science or Humanities Elective	3		
Electives	10½-13½		
	30		

* Electives to be chosen in consultation with adviser.

** For **Specialization in Family Life Education:**
3 units of Biology (101, 102, 103, 344, 345, or 346).
FMSC 436.
one of FMSC 320, 324, or 420.
one of FMSC 316 or FMSC 404.
one of FMSC 312, 314, 322, or 326.
one of FMSC 338, 340, 342, or 440.
7½ units of FMSC or HMEC electives.
Statistics 203.

For **Specialization in Family Consumer Services:**
Biology 101, 102 or 103.
Chemistry 103.
FMSC 338, 340 and 342.
one of FMSC 320, 322, 324, 326, 420, 422, 436, 440, 442.
one of FMSC 312, 314, 316, 414, or HMEC 310.
3 units of FMSC or HMEC electives.
6 units from **one** of the following:
Clothing, Textiles, and Design (FMSC 350, HMEC 352, 354, 360, 366, 406, 450, 452, 454, 456, 460).
Foods and Nutrition (HUNU 201, 205, 209, 301, 303).

HUMAN NUTRITION PROGRAM (B.Sc.) in NUTRITIONAL SCIENCES

The Human Nutrition Major in Nutritional Sciences is an academic program open to students registered in the Faculty of Science. Students should consult the **Faculty of Science** section of the *Calendar* for the general Faculty requirements and regulations pertaining to the Major.

The program in Nutritional Sciences is specifically intended for those students interested in basic nutritional sciences, who desire preparation for graduate study and research in Nutrition, and for students who plan to proceed to an area of Agriculture or Health Sciences in which a background in nutrition would be of value. All students take required courses in both animal (comparative) and human nutrition, but each student may select additional courses to emphasize one area or the other.

Before registering for each of the second, third, and fourth years of this program, every student must obtain formal program approval from an adviser in either the School of Family and Nutritional Sciences or the Faculty of Agricultural Sciences.

Requirements for the degree of Bachelor of Science:

Major

First Year	*Units*	*Second Year*	*Units*
Biology 101, 102 or 103	3	Biology 200 and 201	3
Chemistry 110 or 120	3	Chemistry 230 (or 203)	3
English 100	3	Microbiology 200	3
Mathematics 100, 101 (120, 121)	3	Arts Elective[1]	3
Physics 110, 115, or 120	3	Science Elective[1]	3
Total	15	Total	15

Third Year	*Units*	*Fourth Year*	*Units*
Animal Science 321[2] or Food Science 301[2]	1½	Animal Science 323[2] or Human Nutrition 309[2]	1½
Biochemistry 301 and 302	3	Animal Science 425	1½
Biology 300	1½	Biology 334 and 335	3
Biology 353	3	Arts Elective	3
Human Nutrition 305 and 307	3	Science Elective	1½
Electives[1]	3	Electives[1]	4½
Total	15	Total	15

[1] Electives to be chosen in consultation with adviser. Students are cautioned to take due regard to prerequisites.

[2] Students must take either Sequence A: Animal Science 321 and 323; or Sequence B: Food Science 301 and Human Nutrition 309.

Recommended Science Electives:

Biochemistry 402 (1½), 403 (1½).
Biology 310 (1½), 333 (1½), 350 (1½), 354 (1½), 450 (1½), 453 (1½), 454 (1½), 456 (1½).
Chemistry 205 (3), 311 (2), 313 (3), 335 (3), 421 (1).
Computer Science 111 (1½), 118 (1½), 124 (1½), 126 (1½).
Mathematics 200 (1½), 221 (1½).
Medical Genetics 410 (1½), 420 (1½).
Microbiology 302 (1½), 307 (1½), 308 (1½).
Pharmacology 305 (3).
Physiology 422 (1½), 423 (1½), 424 (1½), 426 (1½).
Statistics 205 (1½).

Nutritional Sciences Electives:

Human Nutrition 303 (1½), 403 (1½), 407 (3), 409 (1½), 411 (1½), 419 (1½), 467 (1½/3).
Animal Science 412 (1½), 420 (1½).
Food Science 302 (1½), 402 (1½), 418 (1½).

Note: With the exception of Human Nutrition 409, none of the Nutritional Sciences electives may be used to satisfy the Faculty of Science requirement of 21 units of Arts and Science courses, including 15 units of Science, numbered 300 and above.

DIETETICS PROGRAM (B.Sc. (Dietet.))

The Dietetics program is designed to provide academic preparation for students interested in pursuing careers as professional dietitians. Graduates of the program may apply for a one year internship following graduation, in order to qualify for membership in the Canadian Dietetic Association or the B.C. Dietitians' and Nutritionists' Association.

Admission Requirements:

See *Admission to the University* in the General Information section of the *Calendar.*

Required: Algebra 12, Chemistry 11, Physics 11.

Recommended: Chemistry 12, Biology 11, and as many Food and Nutrition courses at the grades 11 and 12 levels as possible.

Applicants who cannot meet the requirements exactly as specified should submit a special appeal to the Office of the Registrar with their application forms. The Director will consider all appeals.

First Year	*Units*	*Second Year*	*Units*
Biology 101, 102 or 103	3	Biology 200	1½
*Chemistry 103, 110 or 120	3	Biology 201	1½
English 100	3	Chemistry 230	3
Mathematics 100	1½	Commerce 329	1½
Mathematics 101	1½	HUNU 201	3
**Social Science Elective	3	HUNU 211	1½
	15	Microbiology 200	3
			15

Third Year	*Units*	*Fourth Year*	*Units*
***Biochemistry 302	1½	HUNU 401	1½
HMEC 300	1½	HUNU 407	3
HUNU 305	1½	HUNU 411	1½
HUNU 307	1½	HUNU 421	1½
HUNU 309	1½	*****Electives	7½
HUNU 321	1½		15
Physiology 301 or Biology 353	3		
****Statistics	1½		
*****Elective	1½		
	15		

* Students enrolling in Chemistry 110 or 120 are required to take Physics 110, 115 or 120 concurrently. Social Science electives would be taken in the third and fourth years in place of Electives.

** Choose from: Psychology 100 or 206, Anthropology-Sociology 100, Anthropology 200, Sociology 200 or Family Science 200.

*** In exceptional cases, credit will be granted for Biochemistry 300 in place of Biology 201 and Biochemistry 302.

**** Recommended courses are Biology 300, Plant Science 321 or another introductory statistics course as listed in the *Calendar*, under Probability and Statistics courses.

***** At least three units of electives must be at the 300 and 400 level.

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.*

THE FACULTY OF FORESTRY

ACADEMIC STAFF

Office of the Dean

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EROL VAROGLU, M.Eng. (Istanbul), M.Sc., Ph.D. (Stanford).

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PETER R. W. SANDERS, B.S.F., M.F. (Brit. Col.), R.P.F. Resident Silviculturist, Malcolm Knapp Forest, Maple Ridge.
KENNETH DAY, B.Sc.F. (Lakehead), R.P.F. Resident Forester, Alex Fraser Forest, Williams Lake.

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 leading to a Major 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. The adjacent south campus area also has a containerized forest seedling nursery, operated by the Faculty for teaching, research and demonstration purposes.

In addition to the lecture and laboratory classrooms the Faculty of Forestry has two large teaching and research forests; the Malcolm Knapp Research Forest in Maple Ridge comprising an area of 5,156 hectares of coastal forests and the Alex Fraser Research Forest, near Williams Lake, comprising some 8,000 hectares of interior forests. Formal field classes, special studies and professional exercises are conducted by students at each of these forests.

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 carries 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

The Faculty of Forestry will accept applications for admission from students with varying educational preparation: (1) directly from senior secondary graduation with appropriate science program; (2) following a year of university at UBC or its equivalent at another post-secondary institution; (3) after the completion of a two-year Forestry Diploma Program at a recognized Institute of Technology.

Students entering from grade 12, British Columbia, must have met the general university entrance requirement (see General Information section of this Calendar) and as well have completed 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 the First Year Science program at UBC, or the equivalent, 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 major programs. 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 140 and 141 for Forest Resources Management Majors); Biology 12, or 101 or 102; Physics 12, or 110 or 115 or 120; and Chemistry 12, or 110 or 120, or their equivalents. The subject selected from the Chemistry, Physics, and Biology courses is to be the one not taken at the Grade 12 level. Students who select the Forest Science 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 graduating from a two-year Forestry Technology Diploma program must have achieved an overall average of at least 65% in their program. Provided that the students have the science and mathematics requirements from secondary school graduation as outlined above, consideration will be given to individual courses of study in determining the transfer credits that may be applied in various Forestry degree programs.

Application for admission by students or graduates of other universities, colleges, or other faculties will be reviewed individually. 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.

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.

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 (including transfer students) who have obtained credit for English 100 but who have not passed the ECT will write it at the first available sitting (i.e., September). The Test will also be given during the December examination period, in late March 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.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

(1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.
(2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

The last date for passing the English Composition Test is the late March sitting in the calendar year in which the student intends to enter Third Year Forestry.

Part-time Studies

In cooperation with Guided Independent Study, 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.

Extra-sessional Courses

Three courses in the Forestry Programs are taken outside the normal academic year. These are Harvesting 263, Basic Forest Surveying preceding second year; Forestry 351, Interior Field School preceding third year; and Forestry 451, Field Work in Harvesting, Silviculture and Mensuration immediately following third year. Students requiring these courses in their program are advised to take these courses in correct sequence to ensure steady progress and timely completion of degree programs.

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.

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 90% of the required in session program will be considered for awards.
(2) Students who wish to drop courses may do so within two weeks of the start of the course for one term courses and three weeks for two term courses, by obtaining permission from the appropriate undergraduate advisor. After this deadline courses may only be dropped under exceptional circumstances and with the approval of the Associate Dean.

    Those who fail to write the final examination or who do not complete other course requirements and when circumstances do not warrant deferred standing, will be assigned an F standing. Supplemental privileges will not be granted in such instances.
(3) Honours standing on graduation will be granted to those students who have completed at least 90% of the required 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 reregister 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.

Awards and Financial Aid

Undergraduate Forestry students are eligible for a range of assistance including prizes, scholarships, bursaries and loans. Prizes and scholarships are awarded on the basis of academic standing although other factors may also be considered. Many scholarships are awarded on the recommendation of the Faculty, while others are assigned by the Awards Office. In the last academic session, approximately 35 students received academic awards totalling $50,000. The University also offers bursaries to students demonstrating financial need. These awards are assigned by the Awards Office and students are required to

submit a detailed application outlining their financial circumstances. In the previous academic session, 14 students received approximately $24,000 in bursary support. The major source of financial assistance is available through the British Columbia Student Assistance Program which combines a Canada Student Loan and a British Columbia Loan. Details on these programs are contained in a supplement to the UBC Calendar called "Awards & Financial Aid". Students who wish to be considered for awards and financial assistance are urged to consult this supplement which is available in the spring from the Awards Office.

STUDY PROGRAMS

Forest Resources Management Major (B.S.F.)

The study program in Forest Resources Management is designed to educate thoughtful, responsible and adaptable professionals with a comprehensive understanding of the discipline, an ability to acquire specific knowledge and skills as required, and the confidence to play a decision-making role in a wide variety of resource management situations. Additionally, the program provides a foundation for advanced studies in many aspects of forest resources management. Graduates, after appropriate work experience and examination, should be eligible for registration as professional foresters.

Forest Resources Management is the most general of the four majors offered by the Faculty of Forestry and involves all aspects of forest resources biology and management. The resources considered include fisheries, range, recreation, timber, water and wildlife. The core program provides students with an introduction to the biological, physical, and social sciences upon which forest resource management is based; a working knowledge of the characteristics of forest resources, their interactions, and the ways in which they can be manipulated to yield a socially optimum mix of goods and services; an ability to use quantitative and interpersonal skills necessary in the management of forest resources and an awareness of the technologically advanced tools and techniques available to resource managers; an understanding of the political and socio-economic environment in which forestry is practised, and an appreciation for the historical and ethical foundations of the profession. Through their choice of electives, students may emphasize biological, economic, social or quantitative aspects of resources management. Throughout the program, emphasis is placed on encouraging communicative skills, both oral and written; creative thinking; critical analysis and professional pride.

For students entering the Faculty of Forestry from senior secondary school, the program consists of a minimum of 61 units of in-sesssion and 7 units of extra-sessional course work, normally taken over a four-year period. For those students entering the Faculty of Forestry from First Year Science at the University of British Columbia (or its equivalent), the program consists of a minimum of 47 units of in-session and 7 units of extra-sessional course work, normally taken over a three-year period.

Students entering from senior secondary school

First Year		Second Year	
English 100	(3)	Economics 100	(3)
Mathematics 100, 101	(3)	English 301	(1½)
Biology 101 or 102	(3)[1]	Soil Science 200	(1½)
or Chemistry 103 or 110		Geography 204	(1½)
or Physics 110		Forestry 204	(2)
Forestry 111	(3)	Forestry 237	(1½)
Forestry 131	(1½)	Forestry 238	(1½)
Forestry 132	(1½)	Humanities or Social Science Elective[2]	(1½)
		Free Elective[2]	(1½)
	(15)		(15½)
		Forest 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)	Wood Science 475	(1½)
Forestry 325	(1½)	Forestry 497	(1)
Forestry 327	(1)	*or* Forestry 499	(3)
Forest Harvesting 262	(1½)	Humanities or Social Sciences Elective[2]	(1½)
Forestry 290	(1½)	Free Electives[2]	(4½-6)[6]
Plant Science 304	(1½)		
Free Elective[2]	(1½)		
One course to be chosen from Forestry 385, 386, or 395	(1-1½)		
	(16-16½)		(14½-15)
Forestry 348	(1)	Forestry 451[5]	(3)
Forestry 351[4]	(1½)		

Students entering from First Year Science (or its equivalent)

First Year		Second Year	
(See Faculty of Forestry admission requirement)		Economics 100	(3)
		English 301	(1½)
		Soil Science 200	(1½)
		Geography 204	(1½)
		Forestry 111	(3)
		Forestry 131	(1½)
		Forestry 132	(1½)
		Forestry 204	(2)
			(15½)
		Forest Harvesting 263[3]	(1½)
Third Year		**Fourth Year**	
Forestry 237	(1½)	Forestry 290	(1½)
Forestry 238	(1½)	Forestry 415	(1)
Forestry 305	(1½)	Forestry 421	(1½)
Forestry 306	(1½)	Forestry 432	(1½)
Forestry 308	(1)	Forestry 445	(½)
Forestry 309	(1)	Wood Science 475	(1½)
Forestry 319	(1½)	Forestry 497	(1)
Forestry 325	(1½)	*or* Forestry 499	(3)
Forestry 327	(1)	**One** course to be chosen from Forestry 385, 386 or 395	(1-1½)
Forest Harvesting 262	(1½)		
Plant Science 304	(1½)	Humanities or Social Science Elective[2]	(1½)
Humanities or Social Science Elective[2]	(1½)	Free Electives[2,7]	(3-4½)
	(16½)		(15½-16½)
Forestry 348	(1)	Forestry 451[5]	(3)
Forestry 351[4]	(1½)		

Footnotes:

[1]Select 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]Electives should be chosen in consultation with a faculty adviser.

[3]Held in the week immediately preceding second year, and for five consecutive Saturdays.

[4]Seven working days of field study in the Interior of British Columbia immediately prior to the commencement of third year.

[5]Eighteen working days of field study at the University Research Forest immediately following the spring examination period of third year.

[6]Those students who elect Forestry 497 require 6 units; those who elect Forestry 499 require 4½ units.

[7]Those students who elect Forestry 497 require 4½ units; those who elect Forestry 499 require 3 units.

Forest Harvesting Major (B.S.F.)

The Forest Harvesting major is designed to prepare the graduate for professional forestry responsibilities with emphasis on the planning, design and administration of forest harvesting operations. Specific areas of study include: the design and construction of forest roads, bridges and drainage structures; selection, planning and supervision of logging systems; site protection and rehabilitation; design of special projects such as log handling, sorting and transportation facilities; and, the design and development of computer applications for the analysis of harvesting systems. Graduates, after appropriate work experience and examination, should be eligible for registration with the Association of B.C. Professional Foresters.

The program consists of a minimum of 67 units of in-session and 7 units of extra-sessional course work. There are 4½ 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 adviser. A graduating project must be completed involving a topic within the student's concentration.

Students entering from senior secondary school

First Year		Second Year	
English 100	(3)	Economics 100	(3)
Mathematics 100 and 101	(3)	Soil Science 200	(1½)
Biology 101 *or* 102		Forestry 204	(2)
or Chemistry 103 *or* 110	(3)[1]	Forestry 237	(1½)
or Physics 110		Forestry 238	(1½)
Forestry 111	(3)	Forest Harvesting 260	(1½)
Forestry 131	(1½)	Forest Harvesting 262	(1½)
Forestry 132	(1½)	Mathematics 200 *or* Commerce 329 *or* Commerce 457	(1½)
		Physics 170	(1½)
		Physics 236	(1½)
	(15)		(17)
		Forest Harvesting 263[2]	(1½)

Students entering from senior secondary school

Third Year		Fourth Year	
Forestry 305	(1½)	Forestry 325	(1½)
Forestry 306	(1½)	Forestry 332	(1½)
Forestry 308	(1)	Forestry 333	(1½)
Forestry 309	(1)	Forestry 442	(1½)
Forestry 327	(1)	Forestry 462	(1)
Forest Harvesting 359	(1½)	Forest Harvesting 459	(1½)
Forest Harvesting 362	(1½)	Forest Harvesting 463	(1½)
Forest Harvesting 363	(1½)	Forest Harvesting 464	(1½)
Forestry 385	(1)	Forestry 497	(1)
Civil Engineering 230	(1½)	Forestry 445	(½)
or Wood Science 376		Wood Science 476	(1½)
Wood Science 475	(1½)	Wood Science 488	(1½)
Social Science *or*		Technical Elective	(1½)
Humanities Elective	(1½)		
Technical Elective	(1½)		
	(17½)		(17½)
Forestry 348	(1)	Forestry 451[4]	(3)
Forestry 351[3]	(1½)		

Footnotes:

[1]Select one not taken at Grade 12 level.

[2]Held in the week preceding second year and for five consecutive Saturdays.

[3]Seven days of field study prior to start of fall term in third year.

[4]Eighteen working days of field study at the University Research Forest immediately following spring examination period of third year.

Students entering from First Year Science (or its equivalent)

First Year Science		Second Year	
(See Faculty of Forestry		Forestry 111	(3)
Admission requirements)		Forestry 131	(1½)
		Forestry 132	(1½)
		Economics 100	(3)
		Soil Science 200	(1½)
		Forestry 204	(2)
		Forest Harvesting 260	(1½)
		Forest Harvesting 262	(1½)
		Mathematics 200	(1½)
		or Commerce 329	
		or Commerce 457	
		Physics 170	(1½)
			(18½)
		Forest Harvesting 263[1]	(1½)

Third Year		Fourth Year	
Forestry 237	(1½)	Forestry 325	(1½)
Forestry 238	(1½)	Forestry 332	(1½)
Forestry 305	(1½)	Forestry 333	(1½)
Forestry 306	(1½)	Forestry 442	(1½)
Forestry 308	(1)	Forestry 462	(1)
Forestry 309	(1)	Forest Harvesting 459	(1½)
Forestry 327	(1)	Forest Harvesting 463	(1½)
Forest Harvesting 359	(1½)	Forest Harvesting 464	(1½)
Forest Harvesting 362	(1½)	Forestry 497	(1)
Forest Harvesting 363	(1½)	Forestry 445	(½)
Forestry 385	(1)	Wood Science 476	(1½)
Civil Engineering 230	(1½)	Wood Science 488	(1½)
or Wood Science 376		Technical Elective	(1½)
Wood Science 475	(1½)		
	(17½)		(17½)
Forestry 348	(1)	Forestry 451[3]	(3)
Forestry 351[2]	(1½)		

Footnotes:

[1]Held in the week preceding second year and for five consecutive Saturdays.

[2]Seven days of field study prior to start of fall term in third year.

[3]Eighteen working days of field study at the University Research Forest immediately following 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 66½ units of in-session and 4 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.

Students entering from senior secondary school

First Year		Second Year	
English 100	(3)	Economics 100	(3)
Mathematics 100 and 101	(3)	English 301	(1½)
Biology 101 *or* 102		Wood Science 280	(½)
or Chemistry 103 *or* 110	(3)[1]	Wood Science 335	(1½)
or Physics 110		Wood Science 372	(1½)
Forestry 111	(3)	Wood Science 371[2] *or* 377[2]	(1½)
Forestry 131	(1½)	Chemistry 103 *or* 110 *or* 120[3]	(3)
Forestry 132	(1½)	Physics 170	(1½)
		Physics 236	(1½)
		Area of Concentration	(2½)
	(15)		(18)

Third Year		Fourth Year	
Chemistry 230	(3)	Forestry 419	(1½)
Forestry 332	(1½)	Forestry 445	(½)
Forestry 333	(1½)	Wood Science 461	(1½)
Wood Science 371[2] *or* 377[2]	(1½)	Wood Science 473	(1½)
Wood Science 376	(1½)	Wood Science 476	(1½)
Wood Science 482[4]	(1)	Wood Science 487	(1½)
Area of Concentration	(6½)	Wood Science 488	(1½)
		Chemical Engineering 470	(1)
		Forestry 497 *or* 498	(1 or 3)
		Area of Concentration[6]	(3-5)
	(16½)		(16½)
Forestry 348	(1)	Forestry 449[7]	(1½)
Wood Science 353[2, 5]	(1½)	Wood Science 353[2, 5]	(1½)

Footnotes:

[1]Select the one not taken at grade 12 level.

[2]Course offered in alternate years.

[3]If CHEM 103 or 110 has been taken in the first year another course may be substituted.

[4]Wood Science 484 may be taken as an alternative to Wood Science 482.

[5]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 or third year.

[6]Number of units will be determined by whether FRST 497 *or* 498 is selected.

[7]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.

Students entering from First Year Science (or its equivalent)

First Year Science		Second Year	
English 100	(3)	Economics 100	(3)
Chemistry 110	(3)	Forestry 111	(3)
Physics 110	(3)	Forestry 131	(1½)
Mathematics 100 and 101	(3)	Forestry 132	(1½)
Elective	(3)	Chemistry 230	(3)
		Physics 170	(1½)
		Physics 236	(1½)
		Area of Concentration	(2½)
	(15)		(17½)

Third Year		Fourth Year	
English 301	(1½)	Forestry 419	(1½)
Forestry 332	(1½)	Forestry 445	(½)
Forestry 333	(1½)	Wood Science 371[1] *or* 377[1]	(1½)
Wood Science 335	(1½)	Wood Science 461	(1½)
Wood Science 280	(½)	Wood Science 473	(1½)
Wood Science 371[1] *or* 377[1]	(1½)	Wood Science 476	(1½)
Wood Science 372	(1½)	Wood Science 487	(1½)
Wood Science 376	(1½)	Wood Science 488	(1½)
Wood Science 482[2]	(1)	Chemical Engineering 470	(1)
Area of Concentration	(6½)	Forestry 497 or 498	(1 or 3)
		Area of Concentration[4]	(3-5)
	(18½)		(18)
Forestry 348	(1)	Wood Science 353[1, 3]	(1½)
Wood Science 353[1, 3]	(1½)	Forestry 449[5]	(1½)

Footnotes:

[1]Course offered in alternate years.

[2]Wood Science 484 may be taken as an alternative to Wood Science 482.

[3]Ten working days of on-site study of forest products manufacturing plants during a two-week period immediately following the spring examinations of second or third year.

[4]Number of units will be determined by whether Forestry 497 or 498 is selected.

[5]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
(Applies to Wood Science & Industry only)

1. **Forestry**

Second year required course:	Commerce 296 *or* 457
Third and Fourth Years 9½ to 11½ units from:	Soil Science 200, Forestry 204, 237, 238, 305, 306, 319, 325, 415, Harvesting 262, 263.

2. **Business Management**

Second year required courses:	Commerce 296 and 457
Third Year required courses:	Commerce 297, 329, 396, 458.
Fourth Year Electives:	3 to 5 units from Commerce 341, 349, 392, 393, 394, 397, 491; Forestry 319, Economics 201, 301, 302, 355, 360, 361, 365, 370, 371, Law 356; or other approved courses.

3. **Science and Engineering**

Second year required course:	Commerce 296 *or* 457
Third and Fourth Year Electives:	9½ to 11½ units from Chemistry 205, 311, 330; Civil Engineering 230, Applied Science 278; Chemical Engineering 471; Biology 102, 200, 201, 351, 352; Forestry 430, 431, Wood Science 470; Mathematics 152, 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 64½ units of in-session and 7 units of extrasessional 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 238	(1½)
Forestry 131	(1½)	Forestry 305	(1½)
Forestry 132	(1½)	Forestry 306	(1½)
Forestry 204	(2)	Forestry 308	(1)
Geography 204	(1½)	Forestry 309	(1)
Mathematics 100[1]	(1½)	Forestry 327	(1)
Mathematics 101[1]	(1½)	Wood Science 475 *or* 377	(1½)
Physics 110 or 115 or 120	(3)	Forestry 399	(1)
Soil Science 200	(1½)	Area of Concentration	(3)
	(32)		(16)
Forest 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]Five working days of instruction in basic surveying immediately preceding second year, and for five consecutive Saturdays.

[3]Seven days of field study in the Interior of British Columbia during a period immediately prior to the commencement of third year.

[4]Eighteen working days of field study at the University Research Forest during a period immediately following the spring examination period of the Third Year.

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 Biology 324*, 406*, 408**†, 420; Forestry 386**, 395**, 443, 485**; Plant Science 404**, 431†; Soil Science 321†.

*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* Biology 327.
Fourth Year Electives:	6.0 units from Biology 350, Forestry 406, 408, 431, 435, 443; Plant Science 431, 432, 435.

3. **Forest Pathology**

Third Year Electives:	Biology 323; Plant Science 336.
Fourth Year Electives:	6.0 units from Biology 401; Forestry 406; Microbiology 200; Plant Science 437.

4. **Forest Genetics**

Third Year Electives:	3.0 units from Biology 324, 330; 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 Biology 210, 351, 352; Forestry 431, 377; Plant Science 326.
Fourth Year Electives:	6.0 units from Biology 420, 439, 452; Forestry 411; Soil Science 413, 414.

7. **Wildlife Ecology**

Third Year required courses:	Forestry 395; Biology 204.
Recommended Electives:	Plant Science 304; Biology 310.
Fourth Year required courses:	Forestry 495 *or* Biology 408; Animal Science 424; Plant Science 404; (credit will be awarded for either Biology 310 *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 E. 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 Fletcher Challenge Canada 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.

THE FACULTY OF GRADUATE STUDIES

PETER SUEDFELD, B.A. (Queen's), M.A., Ph.D. (Princeton), F.R.S.C., 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.
JAMES RUSSELL, M.A. (Edinburgh), Ph.D. (Chicago), Associate Dean and Professor of Classics.

Graduate Council

The legislative and administrative authority of the Faculty regarding graduate programs of study is vested in the Graduate Council. In all matters concerning admission, scholarships, programs and examinations, the Dean and Associate Deans act, with the Registrar, as administrative officers for the Graduate Council.

Membership of the Graduate Council

Ex-officio Members — The Dean (Chairman) and the Associate Deans of the Faculty, the Registrar (Secretary), and the Vice-President (Research).

Elected Members — Fifty faculty elected by and from members of the Faculty of Graduate Studies; two faculty members of Senate elected by the Faculty of Graduate Studies.

Elected Student Members — Six members elected by and from students registered in the Faculty of Graduate Studies; one student member of Senate elected by the students of the Faculty of Graduate Studies.

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

Adult Education
Advanced Technology Management
Agricultural Economics
Agricultural Extension
Anatomy
Animal Resource Ecology
Animal Science
Anthropology
Applied Mathematics
Architecture
Arctic and Alpine Research
Art Education
Asian Research
Asian Studies
Astronomy and Space Science
Audiology and Speech Sciences
Biochemistry
Biology
Biomedical Engineering
Bio-Resource Engineering
Botany
Business Education
Chemical Engineering
Chemistry
Civil Engineering
Classical Archaeology
Classics
Clinical Engineering
Coal Research
Commerce and Business Administration
Commerce and Business Administration combined with Law
Community and Regional Planning
Comparative Education
Comparative Literature
Computer Science
Computer Systems Research
Counselling Psychology
Creative Writing
Curriculum and Instruction in Education
Dental Science
Economics
Education of Young Children
Educational Administration
Educational Psychology
Electrical Engineering
Engineering Physics
English
English Education (includes ESL)
Experimental Medicine
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
Higher Education
Hispanic Studies
History
History of Education
Home Economics Education
Human Learning, Development and Instruction
Human Nutrition
Human Reproductive Biology (see Obstetrics and Gynaecology)
Human Settlements
Hydrology
Industrial Education
Industrial Relations
International Relations
Interdisciplinary Studies
Italian
Latin
Law
Library Education
Linguistics
Management Information Systems
Materials Engineering
Mathematics
Mathematics Education
Measurement and Evaluation in Education
Mechanical Engineering
Metals Engineering
Microbiology
Micro Electronics
Mining and Mineral Process Engineering
Modern Language Education
Music
Music Education
Neuroscience
Nursing
Obstetrics and Gynaecology (Human Reproductive Biology)
Ocean Studies Council
Oceanography
Oral Biology
Pathology
Pharmaceutical Sciences
Pharmacology
Philosophy
Philosophy of Education
Physical Education
Physics
Physiology
Plant Science
Political Science
Poultry Science
Psychology
Pulp and Paper Engineering
Reading Education
Religious Studies
Remote Sensing
Resource Management Science
School Psychology
Science Education
Science, Technology and Society Studies
Slavonic Studies
Social Foundations of Educational Policy
Social Studies Education
Social Work
Sociology
Sociology of Education
Soil Science
Spanish
Special Education
Statistics
Surgery
Theatre
Transportation Studies
Urban Land Economics
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.)
Combined Doctor of Medicine and Doctor of Philosophy (M.D./Ph.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.)
Combined Master of Business Administration and Bachelor of Laws (M.B.A./LL.B)
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 Arts in Planning (M.A. (Planning))
Master of Science in Planning (M.Sc. (Planning))
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 beginning of 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) (see C. 1 Course Work in this section), 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
   (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 prerequisite 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) Residency
      (i) Students admitted with a Bachelor's degree normally will be required to spend a minimum of three winter sessions in full-time status at the University (see "Graduate Student Status" in this section).
      (ii) Students admitted with a Master's degree normally will be required to spend a minimum of two winter sessions in full-time status at the University. Departments may recommend a longer residency requirement.
      (iii) 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 maintain continuous registration throughout all years until graduation by keeping up with fee payments. Failure to pay fees will result in automatic withdrawal from the Doctoral degree program.
   (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. Courses numbered 500 and above in Library, Archival and Information Studies do **not** satisfy the requirements for courses at the 500 level in the Faculty of Graduate Studies.

2. 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.

3. 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) A six-week period is required between the submission of the approved thesis to the Faculty of Graduate Studies and 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.

E. Supplementals

Supplemental examinations are not granted to students registered in a graduate program.

F. Repeating a Course

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. In a course that is repeated, both marks will appear on the transcript. The higher mark will be used to determine promotion in a program and in any decision to admit or withdraw a student from a program. Averages calculated for other purposes will include both marks.

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 beginning of 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 upper 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. Admission to the Master of Arts in Education and the Master of Education 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, who, in order to graduate, are taking 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 maintain continuous registration throughout all years until graduation by keeping up with fee payments. Failure to pay fees will result in automatic withdrawal from the Master's degree program.

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:

Audiology and Speech Sciences
Chemistry
Combined M.B.A./LL.B.
Community and Regional Planning
Creative Writing
Engineering Physics
Family Studies
Fine Arts (M.F.A.)
Human Nutrition
Neuroscience
Oceanography
Pathology
Pharmacology
Physics
Physiology
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:

Adult Education
Agricultural Economics
Agricultural Mechanics
Anatomy
Animal Science
Anthropology
Architecture
Art Education
Asian Studies
Astronomy
Biochemistry
Bio-Resource Engineering
Botany
Business Education
Chemical Engineering
Civil Engineering
Classical Archaeology
Classics
Commerce and Business Administration
Comparative Education
Comparative Literature

Computer Science
Counselling Psychology
Curriculum and Instruction in Education
Dental Science
Economics
Education of Young Children
Educational Administration
Educational Psychology
Electrical Engineering
English
English Education (includes ESL)
Fine Arts (M.A. only)
Food Science
Forestry
French
Geography
Geological Sciences
Geological Engineering
Geophysics
Genetics
Germanic Studies
Health Services Planning and Administration
Higher Education
Hispanic and Italian
History
History of Education
Home Economics Education
Human Learning, Development and Instruction in Education
Human Reproductive Biology
Industrial Education
Law
Library Education
Linguistics
Materials Engineering
Mathematics
Mathematics Education
Measurement and Evaluation in Education
Mechanical Engineering
Metals Engineering
Microbiology
Mining and Mineral Process Engineering
Modern Language Education
Music
Music Education
Nursing
Pharmaceutical Sciences
Philosophy
Philosophy of Education
Physical Education
Plant Science
Political Science
Poultry Science
Psychology
Reading Education
Religious Studies
School Psychology
Science Education
Slavonic Studies
Social Work
Social Foundations of Educational Policy
Sociology
Sociology of Education
Soil Science
Special Education
Statistics
Theatre
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. Some undergraduate courses offered through Guided Independent Study (i.e. correspondence), through the Knowledge Network by satellite, or through the Inter-Institutional Service may be used as credit toward a graduate degree program. The maximum credit obtainable through these means is three units. Prior approval of the Department and the Dean of Graduate Studies is required.

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.

5. Courses numbered 500 and above in Library, Archival and Information Studies do **not** satisfy the requirements for courses at the 500 level in the Faculty of Graduate Studies.

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.

F. Supplementals

Supplemental examinations are not granted to students registered in a graduate program.

G. Repeating a Course

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. In a course that is repeated, both marks will appear on the transcript. The higher mark will be used to determine promotion in a program and in any decision to admit or withdraw a student from a program. Averages calculated for other purposes will include both marks.

H. 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 must register when they begin their studies. Students who register after the last day for registration for the session in which they begin their studies will normally be required to pay the late registration fee.

2. All Doctoral and Master's degree candidates must maintain continuous registration throughout all years until graduation by keeping up with fee payments.

FINANCIAL ASSISTANCE

The various types of financial assistance available to graduate students at the University of British Columbia are described in the Supplement on "Awards and Financial Aid" available from: Awards & Financial Aid, The University of British Columbia, 50-2075 Wesbrook Mall, Vancouver, B.C., Canada, V6T 1W5.

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: R. Barichello.

Associate Professors: J. D. Graham, T. Hazledine, G. Kennedy, G. C. Van Kooten.

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 the Admissions Section, together with satisfactory agricultural extension experience.

Minimum program requirements include 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, 519. 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, B. H. Bressler, C. T. Friz, W. K. Ovalle, V. Palatý, W. A. Webber.

Associate Professors: B. J. Crawford, K. R. Donnelly, J. T. Emerman, M. E. Todd, 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, neuroendocrinology, morphometrics, cellular immunology, carcinogenesis, hypertension, muscular dystrophy, regeneration, tissue mineralization 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 is 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.

ANIMAL SCIENCE—Ph.D. and M.Sc. degrees

Professor and Head: R. Blair.

Professors: R. M. Beames, C. R. Krishnamurti, B. E. March (Part-time), B. D. Owen.

Associate Professors: K. M. Cheng, R. C. Fitzsimmons, R. G. Peterson, D. M. Shackleton, J. A. Shelford, R. M. Tait.

Assistant Professors: L. E. Hart, G. K. Iwama, R. Rajamahendran.

The Department offers excellent facilities for basic and applied research in nutrition, physiology, embryology, behaviour, genetics, and management of livestock, fish, poultry and wildlife. Teaching and research laboratories provide instrumentation for gas-liquid, thin-layer and paper chromatography, high-pressure liquid 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, fish, 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 and other avian species 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.

Studies on fish are also available, and aquarium facilities are maintained on this campus. 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 Masters 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), M. Patricia Marchak.

Professors: Michael M. Ames, Richard Pearson, Robin Ridington, Martin G. Silverman.

Associate Professors: Braxton Alfred, Marjorie Halpin, Helga Jacobson, J. E. Michael Kew, R. G. Matson, James V. Powell, Elvi Whittaker.

Assistant Professors: John Barker, Michael Blake, Millie Creighton, Dru Gladney, William McKellin, David L. Pokotylo, Margaret Stott.

(See also Sociology listing)

Advanced study in Anthropology is offered in the Department of Anthropology and Sociology. Area interests include North America, the Pacific Rim, South, Southeast and East Asia, Mesoamerica, South America, Oceania and Europe. The main fields of Socio-Cultural Anthropology (including aesthetic anthropology, cultural ecology, symbolic and linguistic anthropology, contemporary theory and applied anthropology), Anthropological Archaeology and Museum Studies are strongly represented.The Department provides training in qualitative, quantitative, archaeological and museum methods. Research facilities are available in the Museum of Anthropology, and in the Archaeology, Social Survey and Small Groups laboratories. The University Library has good collections to support departmental interests, as well as a large collection of microfilm theses, and the Human Relations Area Files. The Department has access to computer resources to support quantitative and qualitative research. Inter-disciplinary contacts are encouraged, and links are maintained with such programs as Asian Studies (which has major library collections), Linguistics, History, Comparative Literature and Geography.

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 program.

INSTITUTE OF APPLIED MATHEMATICS

Professor and Director: Brian R. Seymour (Mathematics).

Professors: Boye Ahlborn (Physics), Uri Ascher (Computer Science), George W. Bluman (Mathematics), Colin W. Clark (Mathematics), Lionel Harrison (Chemistry), Ulrich G. Haussmann (Mathematics), Michael Isaacson (Civil Engineering), David G. Kirkpatrick (Computer Science), Donald Ludwig (Mathematics; Zoology), Robert M. Miura (Mathematics; Pharmacology and Therapeutics), Vinod Modi (Mechanical Engineering), Grenfell Patey (Chemistry), A. John Petkau (Statistics), Martin L. Puterman (Commerce), Michael Quick (Mechanical Engineering), Rodrigo A. Restrepo (Mathematics), Martha Salcudean (Mechanical Engineering), Bernard Shizgal (Chemistry; Astronomy), Avrum Soudack (Electrical Engineering), James M. Varah (CICSR & Computer Science), James V. Zidek (Statistics).

Associate Professors: Richard P. Anstee (Mathematics), Robert Blake (Zoology), Piet de Jong (Commerce), Leah Edelstein-Keshet (Mathematics), Frederick P. Glick (Statistics), Geoffrey Hoffman (Physics), Harry Joe (Statistics), Douw Steyn (Geography).

Assistant Professors: A.B. Dunwoody (Mechanical Engineering), John Fyfe (Oceanography), William Hsieh (Oceanography), Gregory Lawrence (Civil Engineering), Philip Loewen (Mathematics), Wayne Nagata (Mathematics), Dolph Schluter (Zoology), Matthew Yedlin (Geophysics).

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. IAM students can be supervised by faculty members from any department. 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 four 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.

Fluid Dynamics: Computational fluid dynamics, turbulence, environmental fluid dynamics, dynamic meteorology, cavitation, aerodynamics, numerical ocean modelling, dynamics of coherent structures, fluid-structure interactions.

Mathematical Biology: Animal behaviour, ecology, neurobiology, nonlinear dynamics and chaos, morphogenesis, pattern formation, immunology, neural networks.

Optimization: Mathematical programming, combinatorics, graphs, trees, network flows, game theory, decision theory, search techniques, stochastic processes, queuing, dynamic programming, optimal and stochastic control.

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 oral examination covering one major and two minor areas. The exam may be attempted at most twice. The areas for examination must be selected from (1) applied analysis, (2) numerical analysis, (3) optimization and control, (4) combinatorial optimization, or (5) 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 two 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 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 Group II.

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.

Associate Professors: Raymond J. Cole, (Chairman, Graduate Program Committee), Robin P. A. Clarke, Andrew Gruft, Ronald B. Walkey, Woodruff W. Wood.

Assistant Professors: John A. Gaitanakis, Dino Rapanos, Joel Shack.

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 requirements 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 15 units. Full-time students are required to put in no less than two terms of full-time attendance in the program. Part-time study, as defined in this section of the Calendar, is allowed and encouraged, but only with the approval of the Graduate Program Committee of the School of Architecture.

Full-time students normally complete this program within two academic years. No longer than five years may elapse between first registration and satisfactory completion of the entire program, including the thesis.

Course of Study: First Year

Architecture 500 (0) **Graduate Seminar**

and

9 units of courses selected in consultation with the student's adviser, including a minimum of 6 units from courses at the 500 level offered by the School of Architecture and other departments, some of which must be related to the student's research interests; 1½ units of courses should be in **Research Methods** if the student has no background in this area;

and

Architecture 549 (6 units) **Thesis for the M.A.S.A. degree.**

Areas of Study

Research activities and thesis development will be focussed within four areas of study, as follows:

— the technology of building systems and environments;
— design research for special populations (e.g. children, the elderly);
— architectural theory and criticism;
— housing, urban design and development.

The thesis may take the form of research or an innovative design investigation, or be a combination of both these forms. A thesis defence is required.

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, planning, and psychology, in both Alpine and Arctic environments. Current areas of special interest to the Committee are the Western Arctic including Yukon Territory, parts of the Northwest Territories including the high arctic, 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 Indonesia Development Resource and Policy Project is an example of the Institute's activities. With funding from the Canadian International Development Agency (CIDA), the Project's aims include the provision of information on Indonesia's social and economic development, and Canada's role in that development, to researchers, students, non-governmental development organizations and the business community.

The Institute also organizes workshops and conferences, co-sponsors art exhibitions and cultural events, runs a film program, and administers the multifunctional 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, B. M. Morrison, M. Soga, K. Takashima, K. Tsuruta, L. M. Zolbrod.

Associate Professors: K. E. Bryant, Michael S. Duke, K. G. Hansen, J. D. Schmidt.

Assistant Professors: D. Baker, J. Chen, R. Goldman, T. Hellwig, R. Kramer, H. Oberoi, J. Mostow.

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 292,144 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 34,644 volumes. In addition, there are publications bearing on South Asian studies in micro-form and in Western languages. The library is now building its collection of Indonesian and Korean materials.

The Department offers the degrees of Ph.D. and M.A. in Chinese, Japanese and South Asian languages, in the fields of language, literature, and pre-modern history, religion and thought. 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 a B.A. degree with first-class standing in Chinese, Japanese or South Asian languages. 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, Punjabi, Sanskrit, Korean or Indonesian. 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. R. Johnston.

Professors: A.-P. Benguerel, J. H. V. Gilbert, D. D. Greenwood.

Assistant Professors: C. E. Johnson, E.C. Levi.

Senior Instructors: N. Lamb, E. D. MacLeod.

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 externship 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 $200.00 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: Philip D. Bragg.

Professors: E. Peter M. Candido, Pieter R. Cullis, Patrick P. Dennis, Ross T. A. MacGillivray, A. Grant Mauk, Robert S. Molday, James F. Richards, Michael Smith, Gordon M. Tener.

Associate Professors: Caroline R. Astell, Gary D. Brayer, Albert F. Burton.

Assistant Professors: Ruedi Aebersold, Roger W. Brownsey, Ian Clark-Lewis, B. Brett Finlay, Rosemary J. Redfield, Ivan J. Sadowski.

Senior Instructors: Richard E. Barton, Everard M. Trip.

Instructor: Bruce E. Tiberiis.

Facilities are available for original investigations in many fields of biochemistry.

Ph.D. degree

The areas of research possible within the department are: Chromatin structure. Organization of eukaryotic chromosomal DNA. Analysis of the genomes of viruses and yeast. Control of gene expression in eucaryotes, eubacteria and archaebacteria. Structure and function of genes using specific mutagenesis. Structure, organization and expression of genes coding for the clotting factors. tRNA and tRNA genes in *Drosophila* development and aging. Interleukins. The mechanism of the action of insulin and corticosteroids. Hormonal regulation of polyamine synthesis. Membrane structure and function. Cell surface receptors. Neural and retinal photoreceptor membranes. Bacterial and mitochondrial bioenergetics. Active transport. Lipid based targeted delivery systems. Macromolecular crystallography and X-ray diffraction techniques for the characterization of enzymes and protein-nucleic acid complexes. Metalloprotein structure and function. Mechanism of hemoprotein electron transfer.

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

Chairman, Advisory Committee: Dr. Alan G. Lewis (Oceanography).

The field of Biology is not treated by a single department. Rather, opportunities for graduate work in most areas of Biology exist in the specialized Life Science departments. The interdisciplinary graduate program in Biology is designed specifically for those students whose thesis research is primarily biological but requires major input from more than one department. Therefore, to qualify for the Program, the student must propose a plan for graduate thesis research that will have a major interdisciplinary component.

As background, an undergraduate degree in the Life Sciences is preferable but not essential.

At least one member of the candidate's supervisory committee must be from an appropriate department different from that in which the candidate is enrolled.

Students wishing to pursue an interdisciplinary graduate program in Biology should consult the department or departments most appropriate to their field of specialization, and the chairman of the Advisory Committee for the Interdisciplinary Graduate Program in Biology.

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. See also Clinical Engineering.

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 or 7 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: K. Victor Lo.

Professor: John W. Zahradnik.

Associate Professor: Sie-Tan Chieng.

Assistant Professors: Anthony K. P. Lau, Royann J. Petrell, Paul F. Richard.

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: B. A. Bohm, T. Cavalier-Smith, F. R. Ganders, Beverley R. Green, A. J. F. Griffiths, P. J. Harrison, G. C. Hughes, J. R. Maze, G. E. Rouse, W. B. Schofield, F. J. R. Taylor, I. E. P. Taylor, G. H. N. Towers.

Associate Professors: R. E. De Wreede, R. E. Foreman, P. G. Harrison, R. A. Turkington.

Assistant Professors: G. E. Bradfield, E. E. Camm, C. Douglas, N.L. Glass, L. Oliveira.

Associate Members: S. Berch, K. Klinka, D. R. Roberts, G. Straley, N. J. Turner.

Research underway in the Department of Botany extends from molecular genetics, biochemistry and physiology of plants (including fungi) through cytology, plant development, morphology and systematics to ecology and phytogeography. Such a broad spectrum of activities provides for dynamic interactions between subdisciplines. In addition, opportunities for interdisciplinary research projects exist with colleagues in other departments and faculties on campus, such as Forest Science, Plant Science and Physics.

Although basic science is our primary mandate, several of our faculty apply their strengths in the basic sciences to applied problems such as algal culture, tissue culture, forest regeneration and hydroponics.

The Botany Department has most of the major types of equipment used in laboratory and field research in Botany. Of particular note are the large number of controlled environment rooms and chambers, the electron microscopy facility (with transmission, image processing, scanning and x-ray analysis electron microscopes), ultracentrifuges, spectrophotometers, scintillation counters, and equipment for gas-liquid chromatography, high pressure liquid chromatography, gas chromatography-mass spectrometry, atomic absorption spectrometry, and nuclear magnetic resonance spectroscopy.

The Department has a large herbarium with several full-time staff members, housing permanent reference and research collections representing all groups of plants. Over 400,000 specimens are accessioned, including 200,000 specimens of vascular plants, 200,000 specimens of Bryophytes (one of the largest collections in the world), 70,000 specimens of algae, 14,000 specimens of lichens, and 12,000 specimens of fungi. The North East Pacific Culture Collection of Marine Phytoplankton, housed in the Department of Oceanography, is one of the largest in North America and represents a valuable resource for algal physiological and ecological studies.

The Department has an experimental field and full greenhouse facilities. Another important botanical research facility is the Botanical Garden. This includes sections devoted to native, alpine and medicinal plants, and an Asian Garden. Bamfield Marine Station, on the west coast of Vancouver Island, is a unique research facility for marine botany, and also provides courses in many kinds of marine studies.

The broad areas of research possible within the department are:

1. Cell biology and plant biochemistry.
2. Genetics, cytogenetics and plant molecular biology.
3. Plant and algal physiology.
4. Terrestrial and marine ecology.
5. Biosystematics and evolution.
6. Plant development and morphology.

Supervision is available for study of most major groups of plants, fungi and protists.

M.Sc. degree

Prerequisite: First class or high second class B.Sc.

The M.Sc. programme requires a minimum of 15 units with the thesis counting for 6 units. Courses may be selected from the Botany Department and a wide range of related departments on campus, in consultation with the research supervisor and the Head of Department. The M.Sc. degree can be taken on a part-time basis and a M.Sc. without thesis is also available.

Ph.D. degree

Students who are admitted to the M.Sc. programme may, subject to the regulations of the Faculty of Graduate Studies, be granted permission to transfer to a Ph.D. programme provided a first class performance has been obtained in course work and there is clear evidence of research prowess. Exceptional students may be admitted straight to the Ph.D. programme from the bachelors level. Students with an M.Sc. degree apply directly for the Ph.D programme. Although there are no formal course requirements, courses are selected in accordance with the recommendation of the Department and the candidate's Ph.D. committee.

CHEMICAL ENGINEERING—Ph.D., M.A.Sc. and M.Eng. degrees.

Professor and Head: K. L. Pinder.

Professors: R. M. R. Branion, J. R. Grace, J. Lielmezs, A. Meisen, D. W. Thompson, A. P. Watkinson.

Associate Professors: J. L. Bert, B. D. Bowen, C. J. Lim, C. W. Oloman.

Assistant Professors: C. Brereton, J. M. Piret, P. Tessier.

Honorary Professors: N. Epstein, R. J. Kerekes, S. Levine.

Associate Member: D. Kilburn.

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, optimization and control;
(h) Pulp and paper technology;
(i) Energy;
(j) Biotechnology.

The Department also operates a joint research program at the M.A.Sc. and Ph.D. levels with British Columbia Research, with the Pulp and Paper Research Institute of Canada and with the UBC Biotechnology Laboratory 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 successfully 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. degrees. 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. At least 12 units must be at the 500 level.

CHEMISTRY — Ph.D. and M.Sc. degrees

Professor and Head: L. S. Weiler.

Professors: F. Aubke, R. J. Anderson, 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, J. B. Farmer, D. G. Fleming, D. C. Frost, C. A. Fyfe, 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, G. N. Patey, E. Piers, R. E. Pincock, J. R. Sams, J. R. Scheffer, B. Shizgal, R. F. Snider, R. Stewart, A. Storr, R. C. Thompson, J. Trotter, D. C. Walker.

Associate Professors: G. S. Bates, M. Blades, L. D. Burtnick, M. D. Fryzuk, S. G. Withers.

Assistant Professors: S. Moroney, K. Orians, C. Orvig, A. P. Wade.

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:

Acoustic Emission Analysis, Analytical Chemistry, Bio-Inorganic Chemistry, Bio-Organic Chemistry, Bio-Physical Chemistry, Carbohydrate Chemistry, Chemical Applications of the Mossbauer Effect, Chemical Biology, Chemical Kinetics and Reaction Mechanisms, Chemical Physics, Chemistry of Biologically Important Substances, Chemistry of the Solid State, Chemistry of Steroids, Alkaloids and Terpenes, Chemometrics, 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 Magnetic Resonance Imaging, 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 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, M. Isaacson, B. Madsen, D. S. Mavinic, S. Mindess, N. D. Nathan, F. P. D. Navin, M. D. Olson, M. C. Quick, S. O. Russell, Y. P. Vaid.

Associate Professors: D. L. Anderson, J. W. Atwater, G. R. Brown, W. F. Caselton, R. J. Gray, K. J. F. Hall, A. D. Russell, R. A. Spencer, S. F. Stiemer.

Assistant Professors: P. E. Adebar, R. J. Fannin (joint with Forestry), A. Filiatrault (joint with Forestry), G. A Lawrence, H. G. L. Prion.

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 Engineering and Management
- Environment Engineering
- Geotechnical Engineering
- Materials (timber, cement and concrete) and Fracture Mechanics
- Structures and Applied Mechanics, Reliability Theory and Probabilistic Methods
- 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). The comprehensive examination is taken after this and consequently all degree requirements will not be complete in time for Spring graduation in the first year.

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 18 to 22 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 Bachelor's 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 one to three years 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.

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.

CLASSICAL ARCHAEOLOGY — M.A. degree (see Classics)

Knowledge of classical languages not required for admission.

CLASSICS — Ph.D. and M.A. degrees

Professor and Head: J. A. S. Evans.

Professors: A. A. Barrett, Anthony J. Podlecki, James Russell, G. N. Sandy, Shirley Darcus Sullivan, Robert B. Todd.

Associate Professors: E. A. E. Bongie, H. G. Edinger, P. E. Harding, E. H. Williams.

Assistant Professors: A. S. Dusing, W. J. Dusing.

The thesis for the M.A. in Classics may be written in one of the following: Greek Language and Literature, Latin Language and Literature, Greek History, Roman History, 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 Examinations. The Comprehensive Examinations may be weighted toward Greek or Latin Studies without concentrating exclusively on either. Satisfactory knowledge of both Latin and Greek is required; separate Masters of Arts degrees in Latin and Greek are not given.

The M.A. in Classical Archaeology is awarded for successful completion of 15 units of course work, a major essay, and comprehensive examinations. 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.

Associate Member: J. A. McEwen, Adjunct Professor, Electrical Engineering.

Clinical Instructors: G. J. Eisler (B.C.I.T.), R. W. Evans (Children's Hospital), M. Henderson (Kingston General Hospital), J. R. Heyworth (St. Paul's Hospital), G. Klein (Royal Jubilee Hospital), A. LaPointe (Hôtel-Dieu de Montréal), K. D. Whitmore (Royal Columbian Hospital), D. Zilm (Kelowna General Hospital).

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, systems and electronics before applying for entry. Students should consult the Director of the Clinical Engineering Program regarding eligibility for admission.

Courses:

PHED	391	Human Anatomical Systems
BIOL	201	Cell Biology
COMM	329	Principles of Organizational Behaviour
PATH	375	Introduction to Human Pathology
HCEP	454	Systems and Computer Applications in Medicine
HCEP	500	Canadian Health Services
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.

COMMERCE AND BUSINESS ADMINISTRATION — Ph.D., M.B.A. and M.Sc. (Bus. Admin.) degrees

Dean of the Faculty: P. A. Lusztig.

Associate Dean: D. A. Wehrung.

Associate Dean—Professional Programs: F. H. Siller.

Assistant Dean: C. Vertesi.

Director, M.B.A. and M.Sc. Programs: B. Graham.

Director, Ph.D. Program: A. Kraus.

Professors: I. Benbasat, S. L. Brumelle, D. R. Capozza, G. A. Feltham, J. D. Forbes, P. J. Frost, M. A. Goldberg, G. J. Gorn, D. Granot, F. Granot, N. A. Hall (on leave), T. D. Heaver, A. Kraus, M. D. Levi, P. A. Lusztig, K. R. MacCrimmon, T. Oum, C. C. Pinder, R. W. Pollay, M. L. Puterman, B. Schwab, B. Spencer, W. T. Stanbury, M. Thompson, I. Vertinsky, D. A. Wehrung, C. B. Weinberg, J. T. Williams, W. T. Ziemba.

Associate Professors: M. E. Ace, D. R. Atkins, R. E. Blaine (on leave), A. E. Boardman, J. A. Brander, G. Chow, J. D. Claxton, P. de Jong, A. S. Dexter, B. E. Eckbo, B. C. Fauman, R. C. Goldstein, G. Gorelik, S. W. Hamilton, R. L. Heinkel, L. D. Jones, R. F. Kelly, T. Knight, D. C. McPhillips, L. F. Moore, P. N. Nemetz, M. Queyranne, F. A. Siller, D. A. Simunic, J. W. C. Tomlinson, M. W. Tretheway, D. H. Uyeno, G. A. Walter, Y. Wand, W. G. Waters.

Assistant Professors: J. Begley, H. Chen, S. K. Chi, I. M. Cockburn, P. E. Fischer, M. Frank, R. M. Giammarino, R. Helsley, D. Jennings, Y. J. Kim, N. Langton, E. Lee, J. C. Li, B. P. M. McCabe, T. S. McCormick, V. Maksimovic, V. T. Naik, L. Nay, D. Nickerson, S. V. Rao, S. S. Rosenthal, L. Shetzer, D. K. C. Tse, R. Uppal, C. Woo, W. F. J. Wood, J. Zechner.

Lecturers: S. Alisharan, M.-A. Booth, E. Mackenzie, B. Graham, D. H. Y. Lam, D. B. Lockwood, D. J. Meredith, M. Sarkissian, 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 16.5 units of prerequisite Core Courses in their first year:

Commerce 311	Decision Analysis I
Commerce 312	Decision Analysis II
Commerce 313	Quantitative Methods-Analysis
Commerce 323	Human Resources Management I
Commerce 326	Human Resources Management II
Commerce 336	Information Systems For Management
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

Students deficient in English communication skills will be required to enrol in English 301, or its equivalent, and obtain a mark of at least 65 percent before being allowed to enrol in the second year of the M.B.A. program.

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 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.

Advanced Technology Management — M.Eng. and M.Sc. degrees

M.Eng.

This degree is a joint graduate degree between the Faculties of Commerce and Business Administration and Applied Science. It is intended for students who wish to continue with graduate study in Applied Science and also provide themselves with advanced management skills which are particularly well suited for high technology companies. In contrast to the M.B.A., this does not purport to give general management expertise, but is intended to support Applied Science graduates to become more effective in their chosen technological discipline.

All entrants to the program must hold a Baccalaureate degree in Applied Science and satisfy the minimum requirements of the Faculties of Commerce and Business Administration, Applied Science and Graduate Studies. The program of study is determined by the Program Director in consultation with advisors from the appropriate Faculties but will contain at least the following. Nine units of specified Commerce prerequisites, exemptions being given on a course-by-course basis. Six units of Graduate Applied Science. Six units of Graduate Commerce. A summer internship, colloquium participation, and a major essay are required.

M.Sc.

This degree is a joint graduate degree between the Faculties of Commerce and Business Administration and Science. It is intended for students who wish to continue with graduate study in Science and also provide themselves with advanced management skills which are particularly well suited for high technology companies. In contrast to the M.B.A., this does not purport to give general management expertise, but is intended to support Science graduates to become more effective in their chosen technological discipline.

All entrants to the program must hold an Honours Baccalaureate or a Master's degree in Science and satisfy the minimum requirements of the Faculties of Commerce and Business Administration, and Graduate Studies. With the approval of the Faculties of Science, any applicant who has acquired professional research experience equivalent to an Honours Baccalaureate degree in Science may be deemed to have satisfied the Science entrance requirement.

The program of study is determined by the Program Director in consultation with advisers from the appropriate Faculties but will contain at least the following. Nine units of specified Commerce prerequisites, exemptions being given on a course-by-course basis. Six units of Graduate Science. Six units of Graduate Commerce. A summer internship, colloquium participation, and a major essay are required.

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 sessions 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.

Seven divisions of the Faculty of Commerce and Business Administration presently offer approved programs of study leading to the Ph.D. degree. These are:

Accounting
Finance
Organizational Behaviour
Management Information Systems
Management Science
Marketing
Urban Land Economics

Within each of these general areas a variety of special fields maybe 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, 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 Accounting, Management Information Systems, Finance, Organizational Behaviour and Marketing.
(iii) a 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: A. Busza (English), B. Czaykowski (Slavonic Studies), Sima Godfrey (French), M. Goetz-Stankiewicz (Germanic Studies), Robert Kramer (Asian Studies), Arsenio Pacheco (Hispanic and Italian Studies), Robin Ridington (Anthropology and Sociology).

Requirements for Admission:

The Program in Comparative Literature offers opportunities for advanced interdisciplinary study leading to the Ph.D. and M.A. degrees. Fields of study include literary theory, Asian and Western literatures, and the major literatures of Europe and of the Americas. Undergraduates who are interested in preparing for the degrees should acquire competence in at least two languages other than their native language. In addition, comprehensive knowledge of at least one,

and preferably two, literatures should be acquired through study in a double Major program or through the Honours program of one of the language departments. Fifteen units of coursework are required for the non-thesis M.A., twelve for the M.A. with thesis, and nine for the Ph.D. M.A. students and Ph.D. students who have not already done so, will write the Qualifying Examination, a test of the linguistic, analytic and interpretive competence which is fundamental to the discipline of Comparative Literature. Normally, in the second year, Ph.D. students will write their Candidacy Examinations and then proceed to the thesis. Details of seminars to be offered each year are given in the Program's brochure, **Comparative Literature Courses.** For detailed requirements concerning the M.A. degree, with or without thesis, and for the Ph.D., consult the **Handbook for Graduate Students in Comparative Literature**, available from The Program in Comparative Literature, University of British Columbia, 1866 Main Mall, Vancouver, B.C., Canada V6T 1W5.

COMPUTER SCIENCE — Ph.D., and M.Sc. degrees

Professor and Head: M. M. Klawe.

Professors: U. M. Ascher, P. C. Gilmore, J. M. Kennedy, D. G. Kirkpatrick, A. K. Mackworth, N. Pippenger, J. M. Varah.

Associate Professors: S. T. Chanson, J. R. H. Dempster, A. Fournier, R. S. Rosenberg, R. J. Woodham (joint appointment with Forestry).

Assistant Professors: F. Gao, J. J. Joyce, J. J. Little, D. Lowe, P. C. McGeer, G. Neufeld, D. Poole, S. T. Vuong, A. S. Wagner.

Honorary Associate Professor: G. F. Schrack.

Honorary Assistant Professor: C. Woo.

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 (Computational Complexity, Computational Geography, Parallel Processing), Computer Communications, and Distributed Systems. The Department maintains two Symbolics Lisp machines, about 50 SUN workstations, many Apple Macintoshes and several VAX machines all networked together by an Ethernet. Printing facilities include several Apple LaserWriters and access to a Xerox 9700 page printer. Other facilities include an Optronics film scanner/writer, a Raster Tech display and an Ethernet and AppleNet 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: James M. Varah.

The Centre for Integrated Computer Systems Research (CICSR) 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 and Microelectronics, Artificial Intelligence and Computational Vision, 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 Deans of Applied Science (Chairman), Science and Graduate Studies.

It also has an Advisory Committee consisting of the Heads of the Departments of Computer Science, Electrical Engineering, and Mechanical Engineering and senior researchers representing the research groups.

CREATIVE WRITING — M.F.A. degree

Professor and Head: George McWhirter.

Associate Professors: Sue Ann Alderson, C. J. Newman.

Assistant Professors: Hart Hanson, Keith Maillard, Linda Svendsen, Susan Crean, Bryan Wade.

The Department offers a two-year course of resident study leading to the Master of Fine Arts degree. Candidates may choose to take the M.F.A. degree in Creative Writing, or the M.F.A. degree in Stage- or Screen-Playwriting offered in conjunction with the Theatre Department.

Creative Writing

The program leading to the M.F.A. in Creative Writing is based on the premise that capable student authors can benefit from judicious criticism and the requirement to produce work regularly and to meet deadlines. Workshops, conferences, and tutorials are designed to focus attention on the student's poetry, fiction, drama, imaginative non-fiction, the writing of children's literature, and literary translation. Students are expected to read various books and journals for technical improvement in their own writing. For admission requirements, see below.

The Department publishes *Prism International*; graduate students participate in the editing and production of the magazine.

During the two years of the Creative Writing program, a minimum of 18 units of work must be completed, including a thesis. (A reduction of the second-year residency requirement will be considered in exceptional circumstances.) The Creative Writing program consists of work in three genres, chosen in consultation with the Departmental adviser, as described in the Departmental brochure.

In the second year, students will complete a 3-unit thesis consisting of a full-length work in the area(s) of their special interest. The thesis may be a substantial revision and extension of work done during the first year. A work of translation may be used to fulfil the thesis requirement by students with the required ability and linguistic knowledge. (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 programs.

Stage- and Screen-Playwriting

The Creative Writing Department and the Theatre Department offer jointly two programs leading to the M.F.A. degree, one in Stage-Playwriting and the other in Screen-Playwriting. Applicants must be accepted by both Departments. For admission requirements, see below.

Students are required to take appropriate coursework in the Departments of Creative Writing and Theatre as described in their respective brochures. They must also be involved in the staging or production of some of their own work and, in fulfilment of the 3-unit thesis requirement, write the equivalent of a full-length stageplay or TV or film script acceptable to both Departments. The thesis requirement must be met in the second year and may be a substantial revision and extension of work done during the first year.

Admission

Applications may be submitted throughout the year but the deadline is December 1st.

Candidates for the Creative Writing program should submit 75 to 100 pages of work in two or more of the genres listed in the brochure, 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.

Admission to the Stage- and Screen-Playwriting programs is on the basis of a script submission of 75 to 100 pages, including some work in another genre, and also relevant coursework in Theatre at the undergraduate level or equivalent.

The Departmental brochure is available on request to the Department of Creative Writing.

DENTAL SCIENCE — M.Sc. Degree (See also ORAL BIOLOGY — Ph.D. Degree)

Dean: P. B. Robertson.

Professors: D. M. Brunette, V. M. Diewert, D. Donaldson, A. G. Hannam, A. A. Lowe, M. I. MacEntee, B. C. McBride, C. Price, A. S. Richardson, J. Tonzetich, W. W. Wood.

Associate Professors: B. Blasberg, M. A. Boyd, D. C. Clark, G. D. Derkson, T. Gould, P. Leggott, M. Reitzik, R. M. Shah, J. G. Silver, A. E. Swanson, V. V.-J. Uitto,

Assistant Professors: D. B. Clark, J. S. Diggens, G. Gibson, H. J. Hann, R. L. Harrison, W. R. McDonald, D. McDonnell, P. Mojon, C. M. Overall, R. W. Priddy, L. Rucker, J. D. Waterfield, C. B. Wu, L. Zhang.

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.

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 October 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: J. F. Helliwell.

Professors: R. C. Allen, 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, G. R. Munro, K. Nagatani, P. A. Neher, D. G. Paterson, W. C. Riddell, W. E. Schworm, R. A. Shearer, R. S. Uhler, T. J. Wales, J. Weymark, K. J. White, R. M. Will.

Associate Professors: M. Eswaren, G. B. Hainsworth, A. Kotwal, H. Neary, A. Redish, M. Slade.

Assistant Professors: J. D. Boyd, B. Copeland, A. Hansson, K. Hendricks, J. Nason, H. Paarsch, J. Rudin, E. Yun.

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: N. M. Sheehan.

Professors: C. J. Anastasiou, M. Arlin, P. Arlin, T. R. Bentley, D. R. Birch, S. S. Blank, W. B. Boldt, R. Boshier, C. J. Brauner, F. G. Chalmers, A. E. Clingman, L. Cochran, J. R. Coombs, M. Csapo, L. Daniels, J. D. Dennison, V. D'Oyley, J. Friesen, V. Froese, J. Gaskell, J. U. Gray, W. Griffith, R. J. Hills, I. E. Housego, R. Jarman, R. G. Jones, J. W. Kehoe, S. S. Lee, R. MacGregor, D. Milburn, B. Mohan, D. Robitaille, S. M. Rogow, K. Rubenson, J. Sherrill, E. G. Summers, J. N. Sutherland, P. A. Vertinsky, J. Wallin, J. D. Wilson.

Associate Professors: K. Adam-Moodley, J. Allan, D. E. Allison, N. Amundson, D. A. Bain, I. Beattie, W. A. Borgen, D. J. Brown, S. Brough, W. Bruneau, F. A. Carre, R. Chester, R. F. Conry, M. Crowhurst, C. K. Curtis, G. T. Dixon, M. Elliott, G. Erickson, D. Fisher, P. J. Gaskell, C. Gillespie, H. Goelman, S. Kahn, G. Kelsey, P. Koopman, P. Leslie, W. Logan, B. Long, S. E. Marks, A. J. More, R. Neufeld, D. T. Owens, G. Pennington, F. Pieronek, K. Reeder, T. Schroeder, G. Selman, J. Shapiro, K. Slade, C. Staab, R. Steele, L. H. Swanson, W. Szetela, D. C. Thomas, C. S. Ungerleider, P. Verriour, W. Werner, M. Westwood, D. Whittaker, D. Willms, D. C. Wilson, S. Wong, J. Woodrow, L. Woolsey, I. Wright, R. Young.

Assistant Professors: J. Barman, D. Bateson, J. Belanger, M. Bryson, S. Butler, R. Carlisle, J. L. Conry, T. Cook, A. Cumming, J. Daniluk, S. Davies, D-F. Der, S. Donn, M. Early, F. Echols, P. Grimmett, L. Gunderson, B. Haverkamp, B. Housego, I. Ishiyama, J. Jamieson, R. Jobe, V. Kirkness, A. Lukasevich, M. Luke, W. McKee, L. Peterat, H. Polowy, M. Porath, D. D. Pratt, H. Ratzlaff, A. Safty, G. Snyder, T. J. Sork, W. Sutton, J. E. Thornton, R. J. Tolsma, L. Travis, R. Watson, M. Westrom, R. Wild.

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*
   - Home Economics Education
   - 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: R.W. Donaldson.

Professors: H. W. Dommel, R. W. Donaldson, M. R. Ito, E. V. Jull, M. M. Z. Kharadly, C. A. Laszlo, P. D. Lawrence, D. L. Pulfrey, A. C. Soudack, K.D. Srivastava, T. Tiedje (joint appointment with Physics), L. M. Wedepohl, Lawrence Young, Y-N. Yu (Emeritus).

Associate Professors: M. S. Davies, G. A. Dumont, C. S. K. Leung, G. F. Schrack, R. K. Ward.

Assistant Professors: J. G. Apkarian, D. S. Camporese, W. G. Dunford, A. Ivanov, N. A. F. Jaeger, S. Kallel, K. P. Lam, V.C.M. Leung, C. C. H. Ma, J.R. Marti, P. T. Mathiopoulos, S. E. Salcudean (joint appointment with Harvesting and Wood Science), R. F. B. Turner (joint appointment with Biotechnology Laboratory), M. D. Wvong, M. J. Yedlin (joint appointment with Geophysics).

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, VLSI design, and software engineering; power systems and power electronics; solid state; robotics; telerobotics; 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. A departmental graduate studies booklet providing more details and describing current research projects is available on request.

ENGINEERING PHYSICS—M.A.Sc. degree

See Physics

ENGLISH—Ph.D. and M.A. degrees

Professor and Head: H. J. Rosengarten.

Graduate Committee Chairman: P. G. Stanwood.

Professors: K. Alldritt, A. B. Dawson, E. Durbach, J. W. Foster, W. E. Fredeman, A. V. Globe, M. K. Goldberg, G. Good, E. B. Gose, S. E. Grace, J. F. Hulcoop, L. M. Johnson, J. A. Lavin, P. Merivale, I. B. Nadel, W. H. New, A. T. L. Parkin, G. E. Powell, L. R. Ricou, H. J. Rosengarten, I. S. Ross, P. G. Stanwood, K. Stockholder, M. L. Weir, J. L. Wisenthal.

Associate Professors: R. W. Bevis, M. A. H. Blom, T. E. Blom, L. J. Brinton, A. Busza, D. R. Danielson, D. L. Evans, B. L. Grenberg, R. B. Hatch, N. J. Johnson, J. H. Kaplan, E.-M. Kröller, E. R. Labrie, E. P. Levy, P. A. Quartermain, R. G. Seamon, S. W. Stevenson, J. F. Stewart, B. Sylvester, J. Wasserman, F. H. Whitman, G. R. Wieland.

Assistant Professors: L. J. Arnovick, R. Cavell, J. X. Cooper, G. Deer, J. R. Doheny, I. Higgins, N. Hudson, R. C. Johnson, J. K. Kealy, M. H. Kirkley, M. J. Powell, K. Sirluck, A. Srivastava, F. E. Stockholder, P. A. Taylor, P. Yachnin.

The Department offers opportunities for advanced study in English, American, Canadian, and Commonwealth literature, and in English language including rhetoric. The Library has excellent 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, genres and critical approaches. The Department's brochure, *English Courses Offered* provides extensive descriptions of each seminar. 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

Chair: Gillian Creese (Sociology).

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.

EXPERIMENTAL MEDICINE — Ph.D. and M.Sc. degrees

Director: G. A. Quamme, Experimental Medicine, Department of Medicine.

The program is intended for individuals seeking a career in research through training in experimental medicine. It furnishes the opportunity for students to work towards an M.Sc. or Ph.D. degree in experimental medicine in the Divisions of Cardiology, Gastroenterology, Infectious Diseases, Nephrology, Neurology, and Respirology, and in the area of Molecular Medicine, all of which may involve patients and/or experimental animal models. It is anticipated that normally applicants will possess the M.D., D.M.D. or D.V.M. degrees. Non-medical university graduates, however, may apply for admission. The admission requirements of the Faculty of Graduate Studies must be satisfied. The student's research program must be acceptable to his or her research supervisor as well as to the Department's Committee on Postgraduate Degree in Experimental Medicine.

Students should consult the Department for information regarding courses to be offered. A Departmental graduate studies booklet providing more details and describing current research projects is available on request.

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: Daniel Perlman.

Professors: Margaret Arcus, Roy H. Rodgers.

Associate Professors: Phyllis J. Johnson, James White.

Assistant Professors: Brian de Vries, Eleanore L. Vaines.

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, and its alternatives. Both the place of the family in society and the internal dynamics of relationships are examined. The emphasis is on the non-pathological, North American family, studied over the life span.

Admission

Applicants must satisfy the normal admission requirements of the Faculty of Graduate Studies and must have completed an appropriate degree in one of the social sciences or in Home Economics 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 merequires previous completion of a course in behavioural research methods and Statistics 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 and at least 9 units must be in Family Science (FMSC) or Family Studies (FMST) including the three required courses: Family Studies 520 *Theories about the Family*, Family Studies 523 *Analyzing Data in Family Studies*, and Family Studies 524 *Family Development*. Elective Courses 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

Professor and Head: James O. Caswell.

Professors: Roy Kiyooka, Rhodri Windsor Liscombe, Geoffrey Smedley.

Associate Professors: Marvin Cohodas, Serge Guilbaut, Moritaka Matsumoto, Mary Morehart, Debra Pincus, Richard Prince, Barbara Sungur, Jeff Wall, Robert Young.

Assistant Professors: Wendy Dobereiner, John O'Brian, Maureen Ryan, Rose Marie San Juan, Judy Williams.

Senior Instructor: Marc Pessin.

The Department offers opportunities for advanced study of art history in the major periods of European and North American art and 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, photography and sculpture. Training in applied art, commercial art and design, and 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 Science (Aquaculture), Resource Management Science, Zoology)

FOOD SCIENCE—Ph.D. and M.Sc. degrees

Associate Professor and Acting Head: John Vanderstoep.

Professors: Shuryo Nakai, William D. Powrie, James F. Richards, Philip M. Townsley.

Associate Professors: Brent J. Skura .

Assistant Professors: Timothy D. Durance, David D. Kitts.

The Department offers opportunities for advanced study in the fields of food chemistry, physical bromatology, structural bromatology, environmental bromatology, food toxicology 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, 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, Roman spectrophotometer, recording spectrophotometers, recording spectropolarimeter, spin-resonance spectrophotometer, Brabender viscometer, Instron testing machine, fermenter and incubators, small animal facilities, 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.

Associate Professor and Director, Forestry Graduate Studies: D. L. Golding.

Professors: Timothy M. Ballard, J. D. Barrett, Frederick L. Bunnell, J. P. Kimmins, Antal Kozak, D. P. Lavender, D. T. Lester, J. A. McLean, Donald D. Munro, Peter A. Murtha, T. G. Northcote, Laszlo Paszner, Peter H. Pearse, F. Leslie C. Reed, J. N. R. Ruddick, J. Harry G. Smith, G. F. Weetman.

Associate Professors: Alan D. Chambers, Peter J. Dooling, David Haley, Bart J. van der Kamp, Paul Steiner, Robert J. Woodham, John G. Worrall, G. Glen Young.

Assistant Professors: S. Avramidis, Edith L. Camm, J. Carlson, C. P. Chanway, David H. Cohen, Simon Ellis, R. Jonathan Fannin (joint appointment with Civil Engineering), M. C. Feller, A. Filiatrault (joint appointment with Civil Engineering), R. D. Guy, A. F. Howard, Valerie LeMay, Peter L. Marshall, Joseph McNeel, J. D. Nelson, D. E. N. Tait.

Ph.D. degree

Opportunities are offered for advanced study in certain fields concerned with the basic scientific, managerial or economic aspects of forestry and wood science. 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 marketing, chemistry, pulp and paper, wood products engineering and physics, forest harvesting, operations research and planning systems, 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, wood preservation, composite products and wood adhesives, range management, recreation, remote sensing, resource management, silvics, silviculture, soils, timber management, wildlife management, wood science, wood products marketing, pulp and paper, forest harvesting and planning systems, operations research, 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, or approved alternate, 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, or approved alternate, 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: Thesis, counting at least 3 units, at least 3 units chosen from graduate courses in Forestry, including Forestry 545, 547 or 584 or approved alternate, 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, cooperates 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.

Associate Professors: Rae S. Baudouin, Claude P. Bouygues, Hervé Curat, Sima Godfrey, David Highnam, Richard G. Hodgson, Alistair R. MacKay, Edward J. Matte, Valerie Raoul, David Rogers, Ralph Sarkonak.

Assistant Professors: Réjean Beaudoin, E. Bruce Carpenter, Olga Cragg, Heather Franklyn, Richard G. C. Holdaway, André Lamontagne, James Panter, Christine Rouget, 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: E. P. M. Candido (Biochemistry), C. J. Eaves (Medical Genetics), A. J. F. Griffiths (Botany), T. A. Grigliatti (Zoology).

Associate Professors: F. B. Holl (Plant Science), D. M. Juriloff (Medical Genetics), W. R. McMaster (Medical Genetics), R. Peterson (Animal Science), G. B. Spiegelman (Microbiology), C. F. Wehrhahn (Zoology and Resource Ecology).

Faculty Members of the Genetics Program

Professors: D. A. Applegarth (Medical Genetics), P. A. Baird (Medical Genetics), E. P. M. Candido (Biochemistry), C. J. Eaves (Medical Genetics), J. M. Friedman (Medical Genetics), F. R. Ganders (Botany), B. R. Green (Botany), A. Griffiths (Botany), T. A. Grigliatti (Zoology), J. G. Hall (Medical Genetics), R. E. W. Hancock (Microbiology), D. G. Holm (Zoology), D. G. Kilburn (Microbiology), J. Levy (Microbiology), R. C. Miller (Microbiology), J. Schrader (Medicine), M. Smith (Biochemistry), H. F. Stich (Medical Genetics), O. Sziklai (Forestry), G. M. Tener (Biochemistry), R. A. J. Warren (Microbiology), C. J. Walters (Zoology), G. Weeks (Microbiology).

Associate Professors: B. Alfred (Anthropology), C. R. Astell (Biochemistry), J. D. Berger (Zoology), H. W. Brock (Zoology), K. M. Cheng (Animal Science), F. J. Dill (Medical Genetics), S. Gillam (Pathology), M. R. Hayden (Medical Genetics), F. B. Holl (Plant Science), D. M. Juriloff (Medical Genetics), R. T. A. MacGillivray (Biochemistry), B. C. McGillivray (Medical Genetics), W. R. McMaster (Medical Genetics), J. H. Myers (Plant Science), R. Peterson (Animal Science), A. M. Rose (Medical Genetics), G. B. Spiegelman (Microbiology), F. Takei (Medical Genetics), H. S. Teh (Microbiology), C. M. Wehrhahn (Zoology and Resource Ecology), S. Wood (Medical Genetics), J. Worrall (Forest Sciences), S-L. Yong (Medical Genetics).

Assistant Professors: J. T. Beatty (Microbiology), J. Carlson (Forestry and Biotechnology), C. J. Douglas (Botany), L. Glass (Botany and Biotechnology), P. J. Goodfellow (Medical Genetics), M. J. Harris (Medical Genetics), D. Hogge (Medicine), W. Jefferies (Medical Genetics and Biotechnological Lab), F. Jirik (Biomedical Research Centre), D. K. Kalousek (Medical Genetics), J. Kronstad (Plant Science, Microbiology, and Biotechnology), S. Langlois (Medical Genetics), J. McPherson (Plant Science), D. Mager (Medical Genetics), J. Marth (Medical Genetics and Biomedical Research Centre), D. G. Moerman (Zoology), A. D Sadovnick (Medical Genetics), J. Smit (Microbiology), S. S. Tsang (Medical Genetics), F. Tufaro (Microbiology), R. D. Wilson (Medical Genetics), J. Vielkind (Pathology).

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 9 units of course work 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 the first 18 months of study.

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 416.	Advanced Genetics in Agriculture
Animal Science 513.	Quantitative Genetics
Biochemistry 510.	Nucleic Acids — Structure and Function
Biology 334.	Fundamental Genetics
Biology 335.	Principles of Genetics
Biology 337.	Laboratory in Eukaryotic Genetics
Biology 414.	Evolution
Biology 431.	Selected Topics in Eukaryotic Cell Differentiation and Morphogenesis
Biology 432.	Advanced Problems in Genetics
Biology 434.	Population Genetics
Biology 436.	Fundamentals of Cytogenetics
Biology 437.	Advanced Laboratory in Eukaryotic Genetics
Biology 443.	Plant Genetics
Biology 508.	Current Topics in 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
Zoology 509.	Population Genetics
Zoology 510.	Development Genetics

GEOGRAPHY—Ph.D., M.A, and M.Sc. degrees

Professor and Head: H. Olav Slaymaker.

Professors: D. Gregory, W. G. Hardwick, R. C. Harris, D. F. Ley, G. A. McBean, T. G. McGee, T. R. Oke, A. H. Siemens, J. K. Stager, G. C. Wynn.

Associate Professors: T. J. Barnes, M. J. Bovis, M. Church, R. N. North, G. Pratt, D. G. Steyn.

Assistant Professors: P. Austin, K. Denike, D. Edgington, D. Hiebert, B. Klinkenberg, G. Thomas.

NSERC University Research Fellow: C. Burn.

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. Atmospheric Science: dynamic and thermodynamical structure of the atmospheric boundary and cloud layers; marine storms; parameterization in large-scale models; air-sea interaction; climate variability.

2. Climatology: heat and water balances of active surfaces; energy balances at the micro, synoptic and macro scales; urban climatology; atmospheric diffusion processes.
3. 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.
4. 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 interaction 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, Japan, 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 Management Science, Urban Studies, Transportation Studies, 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

Director: C. I. Godwin (Professor, Geological Sciences).

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 terrain analysis, 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 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., M.Sc., M.A.Sc., and M.Eng. degrees

Professor and Head: A. J. Sinclair.

Professors: Richard Lee Armstrong, R. L. St. L. Chase, W. K. Fletcher, R. Allan Freeze, C. I. Godwin, J. W. Murray, J. V. Ross, Glenn E. Rouse.

Associate Professors: W. C. Barnes, T. H. Brown, R. M. Bustin, K. Wayne Savigny, J. L. Smith, P. L. Smith.

Assistant Professors: L. A. Groat, R. J. Knight, J. K. Russell.

NSERC University Research Fellow: C. A. McCammon.

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; a CAMECA SX-50 electron microprobe; a scanning electron microscope; 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 and a microcomputer laboratory is available for student use. Time-sharing computer terminals provide access to one of the largest and most user-oriented computer systems in Canada. A geological K/Ar dating laboratory is provided in cooperation 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 of Canada, the mining industry, and other Earth Science departments at U.B.C (notably Geophysics and Astronomy, Geography, Oceanography, Botany, Soil Science, Metals and Materials Engineering, 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.

Ph.D. degree

Courses in Geology and related fields will be selected in consultation with the candidate's committee.

M.Sc. and M.A.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. and M.Eng. are also offered.

GEOPHYSICS AND ASTRONOMY—Ph.D., M.Sc. and M.A.Sc. degrees

Professor and Head: Robert M. Ellis.

Honorary Professor: Anne B. Underhill.

Professors: Jason R. Auman, Garry K. C. Clarke, Ronald M. Clowes, Gregory G. Fahlman, T. K. Menon, Douglas W. Oldenburg, Harvey B. Richer, R. Doncaster Russell, William F. Slawson, Bernard Shizgal, David W. Strangway, Tadeusz J. Ulrych, Gordon A. H. Walker, Tomiya Watanabe.

Associate Professor: Paul Hickson.

Assistant Professor: Matthew J. 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 hotsupported.

Research programs at optical wavelengths of current interest include photometric studies of stellar populations in the Milky Way and in external galaxies with particular emphasis on globular clusters, photometric and spectroscopic studies of distant galaxies and active galactic nuclei, precise radial velocity studies of nearby stars 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, and large telescopes for cosmological surveys.

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 department provides a UNIX network based on a SUN 4/280 server with associated workstations. In addition, the Astronomy group provides a VAX/VMS environment including 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.

GEOPHYSICS

The department offers theoretically and experimentally oriented M.Sc., M.A.Sc. and Ph.D. programs in a number of key areas of geophysics. Current fields of interest in the department are: glaciology with studies in glacier physics and avalanche research; geomagnetism and aeronomy with programs to investigate the generation mechanism of ultra-low frequency variations in the earth's field and the quasi-d.c. currents induced in power lines by geomagnetic disturbances; time series and inversion studies with applications to seismic processing and mineral exploration; geophysical instrumentation with emphasis on magnetometer development and detection of seismoelectric phenomena; seismology with programs in crustal refraction, multichannel reflection and earthquake studies focussed on understanding the past and current tectonic processes in the Canadian Cordillera and adjacent areas including the active tectonic regime of the offshore region and theoretical and model seismological studies to investigate diffraction phenomena; and analysis and interpretation of potential field data.

Specialized facilities and instrumentation include: an 840 MHz radar system for airborne ice sounding; a mass spectrometer for oxygen isotope analyses; 14 3-component magnetometer systems; 12 digital seismic recorders; a 6 element seismic array; an integrated MICROVAX and SUN workstation processing facility with interactive seismic reflection processing software and color plotting capability.

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 either Geophysics or Astronomy a minimum of 1.5 units of graduate course work taken outside of the Department is required. Appropriate choice(s) of outside course(s) is made in consultation with the graduate adviser.

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, Marketa Goetz-Stankiewicz.

Associate Professors: Leslie L. Miller, Edward Mornin, Peter A. Stenberg, Karl Zaenker.

Assistant Professors: Ronald Beaumont, Jörg Roche, Thomas Salumets.

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: Administrative, Adult and Higher Education, Anthropology-Sociology, Architecture, Community and Regional Planning, Counselling Psychology, Economics, Family and Nutritional Sciences, Family Practice, Geriatric Medicine, Health Care and Epidemiology, Law, Librarianship, Nursing, Pharmaceutical Sciences, 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

Associate Professor and Head: S. Sheps.

Professors: T. W. Anderson, J. H. Milsum.

Associate Professors: M. Barer, F. P. Glick, R. G. Mathias, R. E. Modrow, B. J. Morrison, M. Schechter.

Assistant Professors: G. Anderson, G. Eni, C. Hertzman, A. Kazanjian, S. Marion, J. Tan, K. Teschke, 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. The program requires 28.5 units of study with elective coursework available within the Department as well as in other Departments and Faculties.

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: S. Ciccone (Italian), R. M. Flores (Spanish), A. Pacheco (Spanish), A. Urrello (Spanish).

Associate Professors: M. Chiarenza (Italian), M. G. R. Coope (Spanish), G. De Stefanis (Italian), K. I. Kobbervig (Spanish), I. Rubio (Spanish), M. Tomsich (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, 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, Christopher Friedrichs, Allan Greer, Charles W. Humphries, Edward J. Hundert, Daniel M. Klang, Fritz Lehmann, A. Norbert MacDonald, Peter N. Moogk, Dianne Newell, Allan C. L. Smith, Christopher W. Stocker, Murray M. Tolmie, W. Alan Tully, W. Peter Ward, William Wray.

Assistant Professors: James P. Huzel, Paul Krause, Robert McDonald, Stephen M. Straker.

The Department offers M.A. and Ph.D. programs, each 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 through Napoleon), Germany (the best in Canada), Eastern Europe, radical movements in Europe and North America, medicine and science (The Woodward Library), and East Asia (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: Daniel Perlman.

Professors: I. D. Desai, Melvin Lee, J. Leichter.

Assistant Professors: Susan I. Barr, Peter J. H. Jones, Linda McCargar.

Instructor: C. Daem.

Lecturers from other Departments: Peter Hahn, Professor Obstetrics and Gynecology; Sheila M. Innis, Assistant Professor of Paediatrics.

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, and in selected aspects of clinical and community nutrition. 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, 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) Pre- and postnatal mammalian development of lipid and carbohydrate metabolism; 5) Carnitine metabolism; 6) Energy expenditure and body composition in infants and adults; 7) Maternal nutrition and fetal development; 8) Trace mineral metabolism; 9) Alcohol and nutrient bioavailability; 10) Fetal alcohol syndrome, 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 Nutrition, Dietetics or Foods, Biological or Chemical Sciences, 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

Director and Associate Professor: J. David Hulchanski.

The UBC Centre for Human Settlements (CHS) was established following the 1976 United Nations Conference on Human Settlements held in Vancouver. The interest generated by the "Habitat Conference" led to the formation of a multi-disciplinary research centre within UBC's Faculty of Graduate Studies.

The Centre is part of UBC's School of Community and Regional Planning and reports to a governing council. The faculty members who comprise the CHS Council are from university departments and institutes with interests relating to human settlements. Both the Centre and the School report to the Dean of the Faculty of Graduate Studies.

The aim of the Centre for Human Settlements is to undertake multi-disciplinary research and disseminate information on issues relating to housing, urban and regional development, urban governance, and community development planning. The Centre seeks to engage in policy-relevant research which will help communities build socially and economically stronger and physically more pleasant and efficient human settlements.

CHS research is aimed at identifying, studying and promoting processes by which communities can effectively shape and continually improve their own initiatives. The focus is on developing community-level interaction, identity, institutions and initiatives. The role of senior governments is addressed in terms of identifying what government can do to assist communities in their own development. The Centre also seeks to identify lessons which can be shared within and between industrialized and non-industrialized areas of the world.

Research is focused on the following geographic areas: Canada, with a particular emphasis on British Columbia and northern Canada (northern B.C., Yukon and the Northwest Territories); Australia and Japan; and the Pacific Rim countries in general, as part of UBC's leading role in the region. CHS also responds to requests for research work in other areas of the world where CHS staff and UBC faculty have expertise.

HYDROLOGY

Opportunities are available for graduate work in hydrology in 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)
(4) Introduction to Meteorology and Climatology
(e.g., Geography 300, 301, 302, 303, Physics 421 or Soil Science 414)
(5) Introduction to Surface Water Hydrology
(e.g., Civil Engineering 418, 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	502, 503, 504, 509, 526
Geological Sciences	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—M.A., M.Sc. and Ph.D. degrees

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 of 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, G. F. Curtis (Dean Emeritus), M. A. Hickling, J. Hogarth, M. A. Jackson, D. J. MacDougall, J. M. MacIntyre, A. J. McClean, R. K. Paterson, D. J. Pavlich, D. E. Sanders, A. F. Sheppard, J. C. Smith, J. P. Taylor, A. R. Thompson, E. C. E. Todd, J. M. P. Weiler.

Associate Professors: J. C. Bakan, D. S. Cohen, E. R. Edinger, R. M. Elliott, K. B. Farquhar, R. T. Franson, M. T. MacCrimmon, R. S. Reid, B. V. Slutsky, C. L. Smith, S. M. Wexler.

Assistant Professors: P. L. Bryden, B. R. Cheffins, R. D. Diebolt, I. Grant, R. W. Grant, M. G. Kline, S. Salzberg, J. C. Thomas.

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 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 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 one calendar year.

(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 Faculty of Law or the Faculty of Graduate Studies. Completed forms must be received by the Faculty of Law by April 1 preceding the academic year for which admission is sought.

LINGUISTICS—Ph.D. and M.A. degrees

Professor and Head: David Ingram.

Professors: M. Dale Kinkade, Bernard Saint-Jacques.

Associate Professors: Guy Carden, Patricia Shaw, Michael Rochemont.

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

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. Further information can be obtained from the Graduate Programs Office in the Faculty of Commerce and Business Administration.

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 to 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 28.5 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.	16.5
Year 3: 13.5 units in Law and 3 units of 500-level Commerce or, with the permission of the Joint Degrees Committee,* 12.0 units in Law and 4.5 units of 500-level Commerce	16.5
Year 4: 13.5 units in Law, Commerce 591 (1.5 units), plus 1.5 units of 500-level Commerce course work or, with the permission of the Joint Degrees Committee,* 12.0 units in Law, Commerce 591 (1.5 units), plus 3.0 units of 500-level Commerce course work	16.5
Spring or Summer Session (years 2 and 3, and between years 3 and 4 or after year 4): 4.5 units of 500-level Commerce	4.5
Total	70.0

*Such a permission will be granted for either year 3 or year 4, but not both.

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 (1.5 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. Three 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 Degrees 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.

Promotion Requirements

Continuance in the M.B.A./LL.B. degree program is conditional upon a high standard of performance as determined by an annual review by the Joint Degrees Committee. A student may be permitted to complete either an M.B.A. or an LL.B. alone.

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: D. P. Rolfsen.

Professors: R. A. Adams, G. Bluman, D. W. Boyd, A. T. Bui, P. Bullen, Donald Bures. J. B. Carrell, W. A. Casselman, R. V. Chacon, C. W. Clark, N. J. Divinsky, R. Douglas, W. E, J. S. Feldman, J. J. F. Fournier, A. Frei, N. Ghoussoub, E. E. Granirer, P. Greenwood, U. G. Haussmann, J. C. Heywood, K. Hoechsmann, K. Y. Lam, D. Ludwig, E. Luft, Z. A. Melzak, R. M. Miura, S. S. Page, E. Perkins, R. A. Restrepo, 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, R. Anstee, A. H. Cayford, B. Chang, R. R. Christian, J. E. Coury, L. Edelstein-Keshet, R. Israel, P. J. Kiernan, J. L. MacDonald, G. Maxwell, D. H. Peterson, L. G. Roberts, G. K. White.

Assistant Professors: R. Froese, R. Gupta, C. W. Lamb, P. Loewen, K. W. Nagata.

The Department of Mathematics offers programs of study in most 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: Sander M. Calisal, Dale B. Cherchas, Clarence de Silva, Ian S. Gartshore, Edward G. Hauptmann, Philip G. Hill, Muhammad Iqbal, Vinod J. Modi, Geoffrey V. Parkinson, Hilton Ramsey, Henry Vaughan, Ian Yellowley.

Associate Professors: Karl V. Bury, Robert L. Evans, Stanley G. Hutton, Gary S. Schajer.

Assistant Professors: Yusuf Altintas, Sabih Atadan, A. Bruce Dunwoody, Sheldon Green, Douglas Romilly, 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.

METALS AND MATERIALS ENGINEERING—Ph.D., M.A.Sc., M.Sc. and M.Eng. degrees

Professor and Head: J. A. Lund.

Professors: T. H. Alden, J. K. Brimacombe, L. C. Brown, A. C. D. Chaklader, E. B. Hawbolt, A. Mitchell, E. Peters, D. Tromans.

Associate Professors: N. R. Risebrough, I. V. Samarasekera.

Assistant Professors: P. V. Barr, R. G. Butters, A. Poursartip, G. G. Richards, C. Schvezov.

Research Opportunities:

The department offers opportunities for study in the following fields: casting and solidification of metals, ceramic processes and properties, corrosion, fibre composites, hydrometallurgy and electrorefining, physical metallurgy, pyrometallurgy, remelting processes, semiconductor crystal structures and thermomechanical processing.

A brochure describing the research facilities is available on request from the Department.

M.A.Sc. degree (Metals and Materials Engineering)

Prerequisite: Graduation in Metals and Materials Engineering, Metallurgical Engineering, Mechanical Engineering, Chemical Engineering or Engineering Physics with at least upper Second Class standing (72%).

M.Sc. degree (Materials and Metallurgy)

Prerequisite: Graduation in Physics, Chemistry Mathematics and Physics with at least upper Second Class standing.

M.Eng. degree (Metals and Materials Engineering)

This degree is intended primarily for graduates in Applied Science who may wish to extend their knowledge after a period of engineering practice following graduation.

Ph.D. degree (Metals and Materials Engineering)

Prerequisite: Master of Applied Science degree in a suitable discipline.

Ph.D. degree (Materials and Metallurgy)

Prerequisite: Master of Science degree in a suitable discipline.

After one year's residence at U.B.C. and clear evidence of research ability, well qualified M.A.Sc. and M.Sc. candidates may, subject to the regulations of the Faculty of Graduate Studies, be transferred to a Ph.D. program.

THE CENTRE FOR METALLURGICAL PROCESS ENGINEERING

The Centre has a Board of Management composed of the Dean of Applied Science (Chairman), the Dean of Graduate Studies and the Head of the Department of Metals and Materials Engineering.

MICROBIOLOGY—Ph.D. and M.Sc. degrees

Associate Professor and Acting Head: G. B. Spiegelman.

Professors: B. C. McBride, R. E. W. Hancock, D. G. Kilburn, J. Levy, R. C. Miller, Jr., R. A. J. Warren, G. Weeks.

Associate Professors: H. S. Teh, G. W. Hoffmann.

Assistant Professors: J. T. Beatty, B. Finlay, J. B. Hobbs, W. A. Jefferies, J. W. Kronstad, J. K. Smit, D. Syeklocha, F. Tufaro.

Associate Members: W. Bowie, A. Chow, A. C. Eaves, W. R. McMaster, N. Reiner, J. Schrader, D. Speert, F. Takei, P. M. Townsley, D. Waterfield.

Ph.D. degree

The Department offers opportunities for original research in the areas of molecular and applied microbiology, biotechnology 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 may 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: A. L. Mular.

Professors: C. O. Brawner, J. S. Laskowski and G. W. Poling.

Associate Professors: A. E. Hall, J. A. Meech.

Assistant Professor: R. Pakalnis.

Research Opportunities

The department offers opportunity for study in the fields of mining and mineral processing, including coal preparation. Areas of research interest are:

Mining

Mine property evaluation and mining economics, mine design, mining methods, drilling and blasting, rock mechanics and slope stability, computer simulation of mining operations, and mine services — particularly mine ventilation and climatic control.

Mineral Processing

Unit operations, comminution, process modelling and optimization, expert systems, instrumentation and computer control. Flotation, surface chemistry, fines recovery, effluent control and pollution prevention, coal recovery, treatment of fine and oxidized coal, and precious metals recovery.

The following degrees are offered:

M.A.Sc. — This is a combined research and course program requiring a total of 15 units. A research thesis is assigned 3 to 6 units.

M. Eng. — The degree is awarded for 15 units of course work, 12 of which must be for 500-level graduate courses, plus a report and a comprehensive examination.

Ph.D. — Combines course work with a research thesis.

Students' courses are selected in consultation with faculty to suit their research needs. Not all courses listed in the calendar are offered each year.

Admission

Students must satisfy the admission requirements of the Faculty of Graduate Studies including, for international students whose first language is not English, a minimum TOEFL score of 550. However, the Department of Mining and Mineral Process Engineering requires, for such students, a minimum TOEFL score of 570.

Part-time students are actively encouraged by the department and interested applicants should contact the department for further information regarding course schedules.

Students who wish to be considered for financial assistance should apply for admission as early as possible.

MUSIC—Ph.D., D.M.A., M.A., and M.Mus. degrees.

Professor and Director: William E. Benjamin.

Professors: Martin C. Berinbaum, Wallace Berry, Gregory G. Butler, Stephen G. Chatman, Paul M. Douglas, James L. Fankhauser, Cortland R. Hultberg, John A. Loban, Robert Rogers, Robert Silverman, French A. Tickner.

Associate Professors: Alexandra Browning-Moore, Jane A. Coop, J. Evan Kreider, John E. Sawyer, James R. Schell, Gerald Stanick, Douglas E. Talney, Eric J. Wilson, Eugene N. Wilson.

Assistant Professors: Keith A. Hamel, Geoffrey Michaels, Vera Micznik, John B. Roeder, Rena Sharon, Alan R. Thrasher.

The School of Music 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, ethnomusicology, 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, ethnomusicology and music theory, majors acquire essential knowledge and skills in research to prepare them for further advanced studies. Composition majors concentrate in creative studies.

In performance, the major concentrations include piano, organ, voice, and most orchestral 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 School of Music should be consulted for specific information on this.

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 School 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 School 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.

NEUROSCIENCE—Ph.D. and M.Sc. degrees

Chairman: H. C. Fibiger (Division of Neurological Sciences, Department of Psychiatry)

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 flexible and is intended to accommodate the diverse background of students wishing to enter it, and also takes 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) acceptance from a faculty member willing to act as the student's supervisor in a graduate program in Neuroscience.

The student's graduate program will be decided upon by the student, the adviser and the student's supervisory committee. The formal requirements in this regard, other than those set forth by the Faculty are as follows. The program aims for flexibility so that the individual needs of students with different interests in neuroscience can, as far as possible, be accommodated. Course requirements are normally taken in the first year of the program, and include the comprehensive core courses in Neuroscience (NRSC 500 and 501), as well as courses in Neuroanatomy and Neurophysiology. 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: Joan Anderson.

Associate Professors: Elaine Carty, Elizabeth Davies, Ann Hilton, Carol Jillings, Helen Niskala.

Assistant Professors: Janet Gormick, Jo-Ann Perry, Alison Rice, Anne Wyness.

Requirements:

a) graduation from a baccalaureate program in nursing which included community health nursing, psychiatric nursing, and statistics.

b) sufficient nursing experience to ensure an acceptable level of competence in nursing.

The Program:

This program is currently under review. Prospective students should contact the School of Nursing Graduate Adviser for information on proposed changes.

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: P. C. K. Leung.

Professors: S. B. Effer, P. Hahn, C.-Y. G. Lee, Y. S. Moon, B. Ho Yuen.

Associate Professors: P. C. K. Leung, P. F. McComb, T. C. Rowe, D. Rurak.

Assistant Professors: D. F. Farquharson, M. R. Fluker, J. Krisinger, C. Zouves.

Associate Members: J. T. Emerman, S. Innis, A. M. Perks, R. Rajamahendran, J. P. Skala, W. J. Tze.

The Department of Obstetrics and Gynaecology offers M.Sc. and Ph.D. programs in several areas of mammalian reproductive biology and perinatal 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 opportunitics 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, Slavonic Studies, and Zoology; and from the following institutes: Asian Research, International Relations and Westwater Research; and other groups with related interests such as Resource Ecology 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 interdisciplinary seminars on ocean topics for both faculty and graduate students.

Interested individuals wishing to contact this Council should forward their communication to the Dean of the Faculty of Graduate Studies for transmittal to the Council.

OCEANOGRAPHY—Ph.D. and M.Sc. degrees

Professor and Head: P. H. LeBlond.

Professors: R. J. Andersen, S. E. Calvert, R. L. Chase, P. J. Harrison, A. G. Lewis, T. R. Parsons, G. S. Pond, F. J. R. Taylor.

Honorary Professors: W. M. Cameron, G. L. Pickard.

Associate Professor: T. F. Pedersen.

Assistant Professors: J. Fyfe, W. W. Hsieh, K. Orians.

Associate Members: R. M. Clowes (Geophysics), G. C. Hughes (Botany), J. Smit (Microbiology).

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, palaeoceanography, air-sea interaction, 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, 405 or 414, and 408 unless they have previously taken equivalent courses. Graduate students in physical oceanography will substitute Oceanography 514 for Oceanography 414, 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 Atmospheric Sciences

Courses related to Oceanography are also offered in the Departments of Botany, Chemistry, Geological Sciences, Geophysics and Astronomy, Geography, 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: D. M. Brunette.

Professors: A. G. Hannam, B. C. McBride, J. Tonzetich.

Associate Professors: R. M. Shah, V. V.-J. Uitto.

Assistant Professor: J. D. Waterfield.

Associate Members: V. M. Diewert (Clinical Dental Sciences), T. R. L. Gould (Clinical Dental Sciences), A. A. Lowe (Clinical Dental Sciences), P. B. Robertson (Clinical Dental Sciences).

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), and either ORBI 501 (Craniofacial Biology) or ORBI 502 (Biology of Oral Tissues) during their first year. In addition students will 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 a 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.

Professor: A. P. Autor, D. E. Brooks, Donald J. Campbell, William H. Chase, A. M. Churg, Allen C. E. Eaves, E. Evans, J. A. J. Ferris, J. Frohlich, C. A. Fyfe, J. C. Hogg, J. B. Hudson, M. T. Kelly, D. M. McLean, Richard H. Pearce, Philip E. Reid, Jack Rootman, L. D. Skarsgard, J. A. Smith, William M. Thurlbeck, A. J. Tingle, William S. Wood.

Associate Professors: V. J. Baldwin, M. Bernstein, James E. Dimmick, Shirley Gillam, William Godolphin, J. C. Isaac-Renton, D. Kalousek, G. Krystal, A. B. Magil, P. Olive, Branko Palcic, P. H. Pritchard, E. M. Proctor, Kirsten Skov, F. Takei, J. L. Wright.

Assistant Professors: M. Altamarino-Dimas, J. Chantler, S. R. Dedhar, D. Devine, L. T. Kirby, Gillian Lockitch, M. Noble, J. R. O'Kusky, D. W. Seccombe, Joseph Tai, G. P. Taylor, J. R. Vielkind, David Walker.

Associates: N. Auersperg, J. L. Bert, A. Chow, D. B. Clarke, C. J. Eaves, K. Humphries, Sheila M. Innes, P. A. Keown, J. Oger, Peter Pare, B. Pate, John W. Schrader, W. J. Tze.

Acceptance into the Graduate Program in Pathology is possible for students with diverse scientific backgrounds and with B.Sc., M.Sc. or M.D. degrees obtained with high academic standing. Prerequisites for admission are Biochemistry 300, Physiology 301 and Anatomy 501 or their equivalents. Previous courses in statistics and molecular biology recommended.

PHARMACEUTICAL SCIENCES—Ph.D. and M.Sc. degrees

Professor and Dean: J. H. McNeill.

Professors: Frank S. Abbott, James E. Axelson, Gail D. Bellward, Jack Diamond, Donald M. Lyster, Sidney Katz, Alan G. Mitchell, John G. Sinclair.

Associate Professors: Helen Burt, David Fielding, Marc Levine, Kathleen MacLeod, Keith M. McErlane, James M. Orr.

Assistant Professors: Stelvio Bandiera, Michael Bridges, Albert Chow, Ken Curry, David S. Hill, Peter Jewesson, K. Wayne Riggs, Peter J. Soja, Tim P. Stratton.

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), Pharmacology, Toxicology, Bionucleonics and Pharmacy Administration.

Research facilities include laboratories in each of the major areas of concentration and the equipment necessary to satisfactorily complete assigned projects. The type of equipment available for research includes mass spectrographs, computers, recording spectrophotometers, titrimeters, stability chambers, ultracentrifuges, 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 Acting Head: Michael J. A. Walker.

Professors: Sastry S. R. Bhagavatula, James G. Foulks, David V. Godin, Thomas L. Perry, Ernest Puil, David M. J. Quastel, Morley C. Sutter.

Associate Professors: Catherine C-Y Pang, Robert E. Rangno, Harvey D. Sanders, Rudolf Vrba, Richard A. Wall, James M. Wright.

Assistant Professors: Alfred Fessler, Bernard A. MacLeod, James G. McLarnon.

Associate Members: Thomas L. Perry, Jr., Stephen Sacks.

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 neuropharmacology. Pharmacokinetic and drug metabolism studies also can be arranged.

M.Sc. degree

Prerequisite: A B.Sc. degree in Pharmacology, or a related subject; or an M.D. degree.

Course: If not already taken, Pharmacology 400 and 404, or their equivalents. Thesis, counting 6 units, and courses in related fields selected in consultation with the Department.

PHILOSOPHY—Ph.D. and M.A. degrees

Associate Professor and Acting Head: Howard Jackson.

Professors: Samuel C. Coval, James C. Dybikowski, Thomas E. Patton, Richard I. Sikora.

Associate Professors: Richard E. Robinson, Steven Savitt, Earl R. Winkler.

Assistant Professors: Andrew Irvine, J. Paul Russell, John P. Stewart, Gary A. Wedeking.

Senior Instructor: Elbridge N. Rand.

The Department undertakes doctoral work in epistemology, metaphysics, ethics, applied ethics, political philosophy, logic, philosophy of language, philosophy of law, philosophy of science, philosophy of mathematics, and the history of philosophy.

Prerequisites: Philosophy 301; 302; 3 units from 333, 343, 353, 363, 453, 473, 483; 3 units from 420, 450 or 451 but not both, 460, 470, 490; or their equivalents.

PHYSICAL EDUCATION—M.P.E. degree

Professor and Acting Director: Robert W. Schutz.

Professors: Eric F. Broom, W. Robert Morford, Patricia Vertinsky.

Associate Professors: Angelo N. Belcastro, F. Alex Carre, Douglas B. Clement, Kenneth D. Coutts, Ian M. Franks, Donald C. McKenzie, Richard E. Mosher, Edward C. R. Rhodes, Barbara Schrodt, Gary D. Sinclair, Jack E. Taunton, Ann D. Tilley.

Assistant Professors: Sharon A. Bleuler, Moira Luke, David J. Sanderson, 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; requires advanced courses in Physical Education, and courses in other departments.

PHYSICS—Ph.D., M.Sc. and M.A.Sc. degrees

Professor and Head: Brian G. Turrell.

Professors: I. Affleck, B. Ahlborn, E. G. Auld, D. A. Axen, D. A. Balzarini, A. J. Barnard, R. Barrie, B. Bergersen, M. Bloom, J. H. Brewer, M. K. Craddock, F. L. Curzon, F. W. Dalby, J. E. Eldridge, K. L. Erdman, A. V. Gold, P. C. Gregory, H. P. Gush, R. R. Haering (Hon.), W. N. Hardy, M. D. Hasinoff, R. R. Johnson, G. Jones, P. H. LeBlond, M. 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 (Hon.), L. de Sobrino, T. Tiedje, W. G. Unruh, E. W. Vogt, B. L. White, D. L. Williams.

Associate Professors: D. S. Beder, J. F. Carolan, M. J. C. Crooks, G. W. Hoffmann, Roger Howard, W. H. McCutcheon, P. W. Matthews, A. Ng, G. Semenoff, N. Weiss.

Assistant Professors: M. Halpern, A. MacKay, P. Palffy-Muhoray (Hon.), R. Sobie.

Associate Members: R. Durand, E. Evans (Pathology), G. K. Y. Lam (Pathology), B. Palcic (Pathology).

NSERC University Research Fellows: R. W. Cline, R. Kiefl, M. Sevior, P. C. E. Stamp, C. Waltham.

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
Relativistic quantum mechanics
High T_c superconductivity
Magnetism
Cosmology

(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:*
High intensity laser-matter interactions. Laser fusion science including stimulated scattering, shock compression in solids and atomic physics of fusion plasmas. Laser physics and pulsed laser development. Numerical simulations. Laminar and turbulent flow in liquids. Thermodynamics of heat engines. High current arcs. Industrial physics.

(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 150 uA of protons to 500 MeV in order to produce pions and muons. Also available is 100 nA 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 (uSR). Experiments are also carried out at other laboratories (Brookhaven, Stanford, CERN).

(f) *Semiconductor, Solid State and Surface Physics:*
Electron paramagnetism in solids. Magnetron sputtering of epitaxial films and high T_c superconductors. Thin film hybrids. Electronic properties of semiconductor surfaces and interfacers. Scanning tunneling microscopy of surfaces in air and ultrahigh vacuum. Low temperature scanning tunneling microscopy.

(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. Cryogenic detectors.

(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) *Hyperfine Interactions:*
The electronic structure of graphite intercalation compounds is studied using time-differential perturbed gamma-gamma angular correlations. Magnetic materials are also investigated using nuclear orientation and NMR of oriented nuclei.

(j) *Infrared Spectroscopy of Solids:*
Fourier-Transform spectroscopy from the far-infrared to the visible. Analysis of vibrational bands and electronic transitions, including charge density waves and superconducting energy gaps. Study of organic and high T_c superconductors at temperatures from 2 K to 300 K.

(k) *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.

(l) *Energy Research:*
New electrical energy storage systems, based on the intercalation of alkali metal ions into appropriate host lattices, are being investigated.

(m) *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).

(n) *Physics at High Pressure:*
Matter under extreme conditions: transport properties, equations of state and phase transitions at high pressure and high temperature. Laser-driven shock waves in solids. Hypervelocity impact phenomena. Diamond anvil cells for static high pressure studies.

(o) *High T_c Superconductivity:*
Fundamental and applied studies of high T_c superconductivity. Synthesis of single crystal and polycrystalline materials. Magnetron sputtering and electron beam evaporation of thin films. Theory, muon spin rotation (μSR), transport properties, NMR, superconductivity devices.

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: John C. Brown*, Ralph Keeler, Franco Lioy, C. H. S. McIntosh*, J. A. Pearson, R. A. Pederson*, N. Wilson.

Associate Professors: K. G. Baimbridge, A. Buchan*, N. Kasting, D. A. Mathers, P. C. Vaughan.

Assistant Professors: K. Curry, S. Kehl, Y. N. Kwok*.

Associate Members: M. S. Cynader, R. M. Douglas, P. C. K. Leung, M. Meloche, G. A. Quamme, D. W. F. Schwarz, C. Shaw, S. Vincent.

*Members of the Medical Research Council of Canada "Regulatory Peptide" Group, located in the Physiology Department.

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: B. E. Ellis.

Professors: G. W. Eaton, P. A. Jolliffe, Judith H. Myers, V. C. Runeckles.

Honorary Professor: M. Weintraub (Agriculture Canada).

Associate Professors: R. J. Copeman, F. B. Holl, M. B. Isman, D. D. Paterson, M. D. Pitt, M. K. Upadhyaya.

Assistant Professors: G. B. Ingram, J. C. McPherson, P. F. Mooney, M. Quayle.

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 and breeding, molecular genetics and biochemistry, plant pathology and virology, 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, plant metabolism, 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, for radioisotope studies, for enzyme purification, for plant constituent analysis, and for tissue culture and micropropagation 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 and entomology. 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 Acting Head: Donald E. Blake.

Professors: H. Alan C. Cairns, David J. Elkins, George A. Feaver, K. J. Holsti, Robert H. Jackson, Brian Job, Richard G. C. Johnston, Jean A. Laponce, Michael D. Wallace, Mark W. Zacher.

Associate Professors: Peter A. Busch, R. Kenneth Carty, Paul J. Marantz, Diane K. Mauzy, Philip Resnick, Paul R. Tennant, John R. Wood.

Assistant Professors: Lonny E. Carlile, Heath B. Chamberlain, George Hoberg, Jr., Samuel V. LaSelva.

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.

POULTRY SCIENCE—(see Animal Science)

PSYCHOLOGY—Ph.D. and M.A. degrees

Professor and Head: Richard C. Tees.

Professors: David J. Albert, Michael Chandler, Stanley Coren, K. D. Craig, D. G. Dutton, Ralph Hakstian, Robert D. Hare, Romuald Lakowski, Anthony G. Phillips, J. P. J. Pinel, S. J. Rachman, James A. Russell, J. Steiger, Peter Suedfeld, Lawrence Ward, Jerry Wiggins, D. M. Wilkie, R. Wong, John Yuille.

Associate Professors: Lynn Alden, D. Susan Butt, J. Campbell, R. S. Corteen, Michael W. Chapman, E. Eich, B. Gorzalka, W. Linden, D. Papageorgis, D. L. Paulhus, L. Walker, J. Werker, Tannis MacBeth Williams.

Assistant Professors: Dare A. Baldwin, Rebecca L. Collins, A. Delongis, James T. Enns, Peter Graf, G. J. Johnson, Charlotte Johnston, Darrin R. Lehman, F. Valle.

NSERC University Research Fellow: Catharine H. Rankin.

The Department offers opportunities for advanced study in the following areas of specialization:
(a) Biopsychology
(b) Clinical
(c) Developmental
(d) Forensic
(e) Perception and Cognition
(f) Personality
(g) Social
(h) Environmental
(i) 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 (the program is fully accredited by both A.P.A. and C.P.A.) must develop an acceptable level of clinical skill, and must serve a one-year internship in an approved applied setting as part of their Ph.D. 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 ENGINEERING—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); M. E. Salcudean (Mechanical Engineering); R. W. Kennedy (Forestry); D. Tromans (Metals and Materials Engineering); R. M. R. Branion (Chemical Engineering); G. Dumont (Electrical Engineering), P. Tessier (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 Metals and Materials 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 Project and Maintenance Engineering, Process Engineering, 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

Head: to be appointed.

Professors: Shotaro Iida, Hanna E. Kassis.

Associate Professors: Charles P. Anderson, Paul G. Mosca (Graduate Adviser).

Assistant Professor: Richard Menkis.

Lecturer from another Department: 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. Hsieh (Oceanography); B. Klinkenberg (Geography); M. Ito (Electrical Engineering); A. K. Mackworth (Computer Science); N. Nathan (Civil Engineering); H. Schreier (Soil Science); G. Thomas (Geography); 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 geographic information systems [GIS], 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 Geophysics and Astronomy, Civil Engineering, Computer Science, Electrical Engineering, Forestry, Geography, Geological Sciences, Oceanography, and Soil Science.

RESOURCE MANAGEMENT SCIENCE — Graduate Programs in Renewable Resource Management.

Committee:

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, 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 in 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: Barrie M. Morrison (Asian Studies).

The many issues raised by the relations among science, technology, and the larger social context require 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

Acting Head: Klaus Petersen.

Professors: Bogdan Czaykowski, Michael H. Futrell, Barbara Heldt.

Associate Professors: Peter Petro, Nicholas Poppe, Christopher J. G. Turner.

Assistant Professor: Irina M. Reid.

Instructor: 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, Donald Finlay, David Freeman.

Associate Professors: Kloh-Ann Amacher, Kathryn McCannell, Jack MacDonald, Mary Russell, Elaine Stolar, Nancy Waxler-Morrison.

Assistant Professors: John Deakins, Harold Goodwin, Madeline Lovell, Ross McClelland, Paule McNicoll, Roop Seebaran, Frank Tester, Sharon Willms.

The School offers opportunities for advanced and specialized studies in social work.

The program involves 18 units of course work as follows:

(a) One two-term course or two one-term courses in the theoretical foundations of social work or social welfare (3 units from SOWK 511, 512, or 513); a two-term course in social work research techniques and methods (3 units from SOWK 551 or 552); and one two-term course or two one-term courses in social policy and program planning (3 units from SOWK 521, 522, or 523).

(b) A methodology/practice specialization consisting of:
—Methodology/practice course(s) (3 units from SOWK 530, 540, 541, 542, 543, 544 or 545, 553, or 554).
—Directed field studies (3 units of SOWK 560) or a thesis (3-4½ units of SOWK 549).

(c) Elective courses in social work or in other disciplines, approved by the candidate's program committee (1½-3 units).

General admission requirements include a Bachelor's degree equivalent to the B.S.W. of the University. 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 available. Students entering the M.S.W. Program normally must have completed courses in research methods and statistics.

Applicants with deficiencies in undergraduate courses in social work or with a Bachelor degree in a related field are admissible but may be required to complete up to 18 units of preparatory 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, course and degree requirements.

SOCIOLOGY—Ph.D. and M.A. degrees

Professor and Head (Anthropology and Sociology): M. Patricia Marchak.

Professors: Yunshik Chang, Martin Meissner, Roy Turner.

Associate Professors: Tissa Fernando, Martha Foschi, Neil Guppy, Graham Johnson, Blanca Muratorio-Posse, R. S. Ratner, David Schweitzer, Nancy Waxler-Morrison.

Assistant Professors: Gillian Creese, Dawn Currie, George Gray, Brian MacLean, Kenneth Stoddart.

Senior Instructor: 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. Superior M.A. candidates may seek transfer 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 and small groups laboratories. There is ready access to the University Computing Centre, Arts Computing for statistical and programming assistance, the Data Library for data archives, and specialized Asian Studies libraries and facilities.

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, Hanspeter E. Schreier.

Assistant Professors: Arthur A. Bomke, Michael D. Novak.

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: A. J. Petkau.

Professors: M. Schulzer, J. V. Zidek.

Associate Professors: F. P. Glick, H. Joe.

Assistant Professors: M. Delampady, N. E. Heckman, J. Liu, R. Zamar.

Associate Members: P. De Jong (Commerce), P. E. Greenwood (Mathematics), M. L. Puterman (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, time series, smoothing regression, optimal design of clinical trials, robust statistics, 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

Professor and Head: R. J. Finley.

Director, M.Sc. Program: Andrew Seal.

Professors: I. G. M. Cleator (General Surgery), P. J. Doyle (ORL), R. J. Finley (CVT), J. K. MacFarlane (General Surgery), D. M. Morrison (ORL), D. W. F. Schwarz (Otorhinolaryngology), C. F. T. Snelling (Plastic Surgery), G. F. O. Tyers (Cardiovascular and Thoracic).

Associate Professors: D. B. Allardyce, F. A. Durity (Neurosurgery), A. D. Forward (General Surgery), B. Nelems (Cardiovascular and Thoracic), A. Seal (General Surgery), I. M. Turnbull (Neurosurgery).

Assistant Professors: N. Davis (General Surgery), V. Gudas (Cardiovascular and Thoracic), M. Meloche (General Surgery), M. Pezim (General Surgery), T. Phang (General Surgery), C. H. Scudamore (General Surgery), C. Shackleton (General Surgery), J. Vestrup (General Surgery).

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

Professor and Head: Errol Durbach.

Associate Professors: John Brockington, Ray Hall, Peter Loeffler, Charles Siegel, Klaus G. Strassmann, Arne Zaslove.

Assistant Professors: Chris Gallagher, Robert Gardiner, Mara Gottler, Rod Menzies, John Newton, John Wright, M. Norman Young.

Instructor: Brian McIlroy.

The Department offers opportunities for advanced studies leading to the M.A. and Ph.D. degrees in Dramatic Literature, Theatre History and Criticism.

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 co-operation with the Department of Creative Writing, the Department offers M.F.A. programs in Stage- and in Screen-Playwriting. (For details of these programs, see Creative Writing in this section of the Calendar.)

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: W. Hardwick (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 Subcommittee 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

Acting Director: Anthony H. J. Dorcey (Community and Regional Planning).

Assistant Director: 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. degrees

Professor and Head: G. G. E. Scudder.

Professors: J. M. Gosline, T. A. Grigliatti, P. W. Hochachka, D. G. Holm, D. R. Jones, C. J. Krebs, P. A. Larkin, A. G. Lewis, N. R. Liley, D. Ludwig, J. D. McPhail, J. Myers, T. G. Northcote, T. R. Parsons, A. M. Perks, J. E. Phillips, D. J. Randall, A. R. E. Sinclair, J. N. M. Smith, H. F. Stich, D. T. Suzuki, C. J. Walters, N. J. Wilimovsky.

Associate Professors: J. D. Berger, R. W. Blake, H. W. Brock, T. H. Carefoot, C. L. Gass, H. E. Kasinsky, W. K. Milsom, W. E. Neill, J. D. Steeves, C. F. Wehrhahn.

Assistant Professors: M. Adamson, M. Jackson, D. Moerman, D. Schluter, T. Snutch.

NSERC-University Research Fellow: J. Post.

Associate Members: A. L. Arsenault, N. Auersperg, W. Jefferies, D. M. S. Webster.

Adjunct Professor: E. M. Donaldson.

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, Zeiss EM10B, Zeiss EM10C STEM, Link x-ray analysis system, Kontron Image Analysis System); 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; morphological and molecular approaches to systematics of parasitic Nematoda; life history tactics in parasitic Nematoda; 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 salmonid fish and mammals; factors affecting reproductive output in wild populations; regulation of breeding activity in natural populations; evolution within populations in both continental and island contexts.

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—P. LeBlond, Head of the Department.
Resource Management Sciences—L. M. Lavkulich, Resource Management Science.
Fisheries—N. J. Wilimovsky, Department of Zoology.
Wildlife Biology—C. J. Krebs, A. R. E. Sinclair, Department of Zoology.

REGISTRATION IN THE FACULTY OF GRADUATE STUDIES, November 1989

Department	Degree	Total
Agricultural Economics	M.Sc.	13
Agricultural Extension	M.Sc.	1
Anatomy	M.Sc.	10
	Ph.D.	6
Animal Science	M.Sc.	33
	Ph.D.	13
Anthropology	M.A.	17
	Ph.D.	15
Architecture	M.A.S.A.	6
Asian Studies	M.A.	18
	Ph.D.	14
Audiology and Speech Sciences	M.Sc.	47
	Ph.D.	1
Biochemistry	M.Sc.	9
	Ph.D.	39

Department	Degree	Total
Biology	M.Sc.	1
	Ph.D.	1
Bio-Resource Engineering	M.A.Sc.	8
	M.Sc.	5
Botany	M.Sc.	17
	Ph.D.	23
Chemical Engineering	M.A.Sc.	15
	M.Eng.	2
	Ph.D.	30
Chemistry	M.Sc.	39
	Ph.D.	148
Civil Engineering	M.A.Sc.	44
	M.Eng.	28
	Ph.D.	43
Classics	M.A.	6
	Ph.D.	7
Clinical Engineering	M.Eng.	3
Commerce	M.B.A.	359
	M.Sc.	39
	Ph.D.	69
	Combined LL.B./M.B.A.	6
Community and Regional Planning	M.A. (Planning)	82
	M.Sc. (Planning)	18
	Ph.D.	14
Comparative Literature	M.A.	6
	Ph.D.	7
Computer Science	M.Sc.	44
	Ph.D.	31
Creative Writing	M.F.A.	29
Dentistry	M.Sc.	7
	Dip. in Peridontics	2
Economics	M.A.	52
	Ph.D.	31
Education	M.A.	340
	M.Ed.	406
	Ed.D.	125
	Ph.D.	30
Electrical Engineering	M.A.Sc.	59
	M.Eng.	2
	Ph.D.	44
English	M.A.	40
	Ph.D.	36
Experimental Medicine	M.Sc.	4
	Ph.D.	3
Family Studies	M.A.	3
Fine Arts	M.A.	21
	M.F.A.	10
	Ph.D.	9
Food Science	M.Sc.	17
	Ph.D.	10
Forestry	M.F.	13
	M.A.Sc.	2
	M.Sc.	43
	Ph.D.	49
French	M.A.	19
	Ph.D.	11
Genetics	M.Sc.	14
	Ph.D.	28
Geography	M.A.	25
	M.Sc.	9
	Ph.D.	30
Geological Engineering	Ph.D.	2
	M.Eng.	1
	M.A.Sc.	3
Geology	M.Sc.	21
	Ph.D.	15
Geophysics and Astronomy	M.Sc.	13
	Ph.D.	20
Germanic Studies	M.A.	8
	Ph.D.	5
Health Sciences	M.H.Sc.	20
Health Services Planning	M.Sc.	27
Hispanic Studies	M.A.	9
	Ph.D.	5
History	M.A.	33
	Ph.D.	21
Human Nutrition	M.Sc.	10
	Ph.D.	4
Human Reproduction Biology	M.Sc.	6
	Ph.D.	5
Interdisciplinary	M.A.	3
	M.Sc.	7
	Ph.D.	18
Law	LL.M.	20
Linguistics	M.A.	8
	Ph.D.	10
Mathematics	M.A.	—
	M.Sc.	25
	Ph.D.	30
Mechanical Engineering	M.A.Sc.	38
	M.Eng.	5
	Ph.D.	29
Metallurgical Engineering	M.A.Sc.	27
	Ph.D.	19
Metallurgy	M.Sc.	1
	Ph.D.	—
Microbiology	M.Sc.	24
	Ph.D.	30
Mining and Mineral Process Engineering	M.Eng.	1
	M.A.Sc.	15
	Ph.D.	6
Music	M.A.	8
	M.Mus.	20
	Ph.D.	10
	D.M.A.	19
Neurosciences	M.Sc.	10
	Ph.D.	17
Nursing	M.S.N.	101
Oceanography	M.Sc.	15
	Ph.D.	19
Oral Biology	Ph.D.	10
Pathology	M.Sc.	9
	Ph.D.	26
Pharmaceutical Sciences	M.Sc.	17
	Ph.D.	20
Pharmacology and Therapeutics	M.Sc.	8
	Ph.D.	12
Philosophy	M.A.	10
	Ph.D.	13
Physical Education	M.P.E.	46
Physics	M.Sc.	30
	M.A.Sc.	4
	Ph.D.	60
Physiology	M.Sc.	7
	Ph.D.	6
Plant Science	M.Sc.	28
	Ph.D.	16
Political Science	M.A.	28
	Ph.D.	16
Poultry Science	M.Sc.	1
	Ph.D.	—
Psychology	M.A.	37
	Ph.D.	57
Psychiatry	M.Sc.	—
Pulp & Paper Engineering	M.Eng.	7
Religious Studies	M.A.	6
	Ph.D.	—
Slavonic Studies	M.A.	2
	Ph.D.	3
Sociology	M.A.	32
	Ph.D.	9
Social Work	M.S.W.	82
Soil Science	M.Sc.	15
	Ph.D.	9
Statistics	M.Sc.	10
	Ph.D.	2
Surgery	M.Sc.	2
Theatre	M.A.	7
	M.F.A.	22
	Ph.D.	1
Zoology	M.Sc.	55
	Ph.D.	52
Total		4,408

THE FACULTY OF LAW

ACADEMIC STAFF

P. T. BURNS, Q.C., LL.B., LL.M. (Otago), Professor and Dean of the Faculty.
E. R. EDINGER, B.A., LL.B. (Brit. Col.), B.C.L. (Oxon), Associate Professor and Associate Dean.
J. J. ATRENS, B.A. (Sask., Oxon), M.A., B.C.L. (Oxon), Professor.
J. BLOM, Q.C., B.A., LL.B. (Brit. Col.), B.C.L. (Oxon), Professor.
M. A. HICKLING, LL.B., Ph.D., LL.D. (London), Professor.
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R. W. GRANT, B.Sc. (Man.) M.Sc., LL.B. (Brit. Col.), LL.M. (Harvard), Assistant Professor.
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The Hon. Mr. Justice J. E. M. NICHOLS, B.A. (Ottawa), LL.B. (Montreal), Judge in Residence.
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R. N. PEARSON, B.A. (Michigan), LL.B. (Boston), LL.M. (Yale), Visiting Professor.
S. STEVENS LL.B. (Brit. Col.), Instructor, Director, Native Law Student Program.
B. D. WOOLLEY, LL.B. (Brit. Col.) Visiting Assistant Professor (part-time).

Adjunct Professors

B. C. ABRAHAM, B.Sc. Geol., LL.B. (Brit. Col.), Mining Law.
J. R. ALDRIDGE, B.A. (Brock), LL.B. (Osgoode), LL.M. (Brit. Col.), Immigration.
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J. ATKINS, B.A. (Brit. Col.), Dip. Appl. Linguistics, LL.B. (Victoria), Legal Writing/Research Program.
D. R. BENNETT, B.Comm., LL.B. (Brit. Col.), Legal Writing/Research Program.
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G. T. W. BOWDEN, B.A., LL.B. (Brit Col.). Taxation I.
E. H. CADMAN, LL.B. (Osgoode), Real Estate Transactions.
E. C. CHIASSON, Q.C., B.A., LL.B. (Brit. Col.), Advocacy.
P. COURTNEY, B.A., M.A. (Trinity College, Dublin), Legal Writing/Research Program.
BRAD CRAMER, B.A., LL.B. (Brit. Col.), Civil Litigation.
D. CUMBERFORD, B.A. (Brit. Col.), LL.B. (Ottawa), Legal Writing/Research Program.
M. D. DONNER, LL.B. (Brit. Col.), Business Assoc. I.
J. K. EDMISON, B.A. (Toronto), LL.B. (Queen's), Close Corporations.
T. ENGLISH, B.Com., LL.B. (Brit. Col.), LL.M. (Harvard), Topics in Corporate and Tax Law.
W. M. EVERETT, B.A. (Manitoba), LL.B. (Brit. Col.), Construction Law.
W. A. FERGUSON, LL.B. (Brit. Col.), Trial Advocacy.
B. FINDLAY, B.A. (Queens), M.A., LL.B. (Brit. Col.), Women and the Law.
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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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R. L. HAYLEY, B.A. (Victoria), Ph.D. (London), LL.B. (Queen's), Construction Law.
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R. D. HOLMES, B.A., LL.B. (Brit. Col.), LL.M. (Yale), Creditors Remedies.
A. B. HUDSON, 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.
W. C. KAPLAN, B.A., LL.B. (Brit Col.), LL.M. (Harvard), Labour Law.
S. A. KLINE, M.D. (Alberta), F.R.C.P.(C), Law and Psychiatry.
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S. LANYON, B.A., LL.B. (Brit. Col.), Topics in Current Labour Policy Issues.
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G. A. LETCHER, B.A., LL.B. (Brit. Col.), Topics in Administrative Law.

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P. MARR, B.A. LL.B. (Dalhousie), M.D. (Ottawa), Topics in Private Law: Law & Medicine.
W. McFETRIDGE, B.Com., LL.B. (Brit. Col.), Legal Accounting.
His Honour Judge H. J. McGIVERN, LL.B. (Brit. Col.), Trial Advocacy and Clinical Criminal Law.
PAUL McGIVERN, B.Com., LL.B. (Brit. Col.), Trial Advocacy.
B. M. McKAY, B.A. (Montreal), LL.B. (Brit. Col.), Business Associations II.
J. C. McKECHNIE, B.A. (Victoria), M.A. (Western Ontario), LL.B. (Brit. Col.), Lawyer as Counsellor.
J. I. McLEAN, B.A. (Queen's), LL.B. (Dalhousie), Insolvency.
R. McRAE, B.Comm., LL.B. (Brit. Col.), Topics in Commercial Law.
C. A. MILLAR, B.Com., LL.B. (Brit. Col.), Succession.
K. MITCHELL, LL.B., B.Comm. (Brit. Col.), B.C.L. (Oxon), Trusts.
C. D. MUTALA, LL.B. (Manitoba), LL.M. (New York), Industrial and Intellectual Property.
K. NEILSON, M.A., LL.B. (Brit. Col.), B.C.L. (Oxon), Trial Advocacy.
M. O'KEEFE, B. Com., LL.B. (Brit. Col.), LL.M. (Berkeley), Taxation II.
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G. O. S. OYEN, B.Sc. (Alberta), LL.B. (Osgoode), Industrial and Intellectual Property.
R. K. PAISLEY, B.Sc. (Brit. Col.), M.Sc. (Wash.), J.D. (Pepperdine), LL.M. (London), Law of the Sea.
L. PETERS, B.A., LL.B. (Brit. Col.), Dip. Droit Civil (Sherbrooke), Dip. Langue Française (Québec à Trois Rivières), Legal Writing/Research Program.
P. G. PLANT, A.B. (Harvard), LL.B. (Southampton), LL.B. (Dalhousie), LL.M. (Cambridge), Legal Writing/Research Program.
M. A. PRATCHETT, B.A. (Toronto), LL.B. (Brit. Col.), Civil Litigation.
A. REES-THOMAS, LL.B. (Wellington), Topics, Procedure & Evidence.
J. REYNOLDS, LL.B. (Hons.), Ph.D. (London), Secured Transactions.
M. ROIMISER, LL.B. (Brit. Col. & Buenos Aires), LL.M. (Southern Methodist), S.J.D. (Buenos Aires), Civil Law.
D. ROSENBLOOM, B.A. (Carleton), LL.B. (Brit. Col.), Topics in Private Law.
G. B. ROY, B.A., LL.B. (Dalhousie), LL.M. (Cambridge), Business Associations II.
G. R. SCHMITT, Q.C., B.A., LL.B. (Sask.), LL.M. (Harvard), Professional Responsibility.
D. H. SEARLE, Q.C., B.C., LL.B. (Alberta), Topics in Natural Resources.
K. SHEPPARD, B.A., LL.B. (Victoria), Secured Transactions.
R. R. SHOULDICE, B.Com., LL.B. (Alta.), Close Corporations.
G. SIMPSON, LL.B./M.A., DLP (Aberdeen), LL.M. (Brit. Col.), Legal Writing/Research Program.
J. SINGLETON, B.A., LL.B. (Alta.), LL.M. (London), Topics in Commercial Law: Construction.
K. J. SMITH, B.A., LL.B. (Brit. Col.), Trial Advocacy.
D. J. SOROCHAN, B.A. (Alta.), LL.B. (Brit. Col.), Trial Advocacy.
J. E. STARK, LL.B. (Victoria), Securities Regulation.
A. R. SZIBBO, B.A. (Waterloo), LL.B. (Brit Col.), Technology & the Law.
R. TUNNICLIFFE, B.Sc., LL.B. (Brit. Col.), LL.M. (Columbia), International Tax.
J. R. UREN, B.S.M.E. (Northrop), M.Eng., J.D. (Cornell), LL.B. (Queen's), Technology and the Law.
G. A. URQUHART, B.Sc. Mech. Engr., LL.B. (Manitoba), Topics in Commercial Law: Construction.
P. G. VOITH, B.Sc. (McGill), LL.B. (Brit. Col.), LL.M. (Columbia), LL.M. (Cambridge), Forest Law.
L. WEBBER, M.B.A., LL.B. (Dalhousie), B.A. (Royal Military College, Kingston), Computers and the Law.
L. M. WEIR, B.A. (McGill), M.A., Ph.D. (National Ireland), Critical Theory & Deconstruction.
N. WEXLER, B.Sc. (McGill), M.A. (Brit. Col.), LL.B. (Osgoode), Trial Advocacy.
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

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 160,000 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 Requirements and Procedures for the LL.B.

General Information

Applications for admission may be obtained from and all correspondence addressed to:

Admissions Office
Faculty of Law
The University of British Columbia
1822 East Mall
Vancouver, B.C. V6T 1Y1

The postmark deadline date for the submissions of applications to the first year of the LL.B. program is February 1. **Late applications will not be considered.**

At the time the application form is submitted, all applicants are required to submit a $40.00 application processing fee. An additional fee of $10.00 is required for processing out-of-province and international documents. Applications received without the correct fee will be returned.

Application forms can be obtained from the Admissions Office of the Faculty of Law. Applicants are advised to submit their application and supporting documents as early as possible in order to facilitate early selection. Although applications without complete documentation will meet our deadline, incomplete applications cannot be processed, and places will not be held for persons whose applications are on file but whose documents have not been received. It is the responsibility of each applicant to ensure that their file is complete. Applicants should, therefore, ensure that official transcripts of their academic record and the official L.S.A.T. score are forwarded as early as possible.

Applicants will be advised in writing as soon as possible whether their applications have been accepted.

A new application form must be submitted each year. Files are kept for one year: material submitted will be brought forward for one year only. Only outdated documents need to be updated.

Letters of reference are not required from regular applicants.

Applicants should 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.

Since the Faculty of Law receives a very large number of applications each year, personal interviews are not granted. The Admissions Officer is available, however, to answer questions (tel. (604) 228-6303).

Transcripts

Applicants not currently enrolled in a college or university (other than U.B.C.) must provide two final official transcripts. These must be submitted directly to the Admissions Office by the issuing institution.

Applicants currently attending a college or university (other than U.B.C.) must provide, at the time of their application, one official transcript which includes marks for the first term, with a further two official transcripts as soon as they become available at the end of the second term. All transcripts must be submitted directly to the Admissions Office by the issuing institution.

Separate transcripts must be submitted from each institution attended. A cumulative record is not sufficient.

It is not necessary to submit U.B.C. transcripts as they are available to the Faculty of Law.

The Law School Admission Test (L.S.A.T.)

All candidates must submit a Law School Admission Test score.

Priority will be given to applicants who have written the L.S.A.T. prior to the February 1 deadline. The latest writing of the L.S.A.T. that will be accepted is February for entrance the following September. The L.S.A.T. is considered valid for four years and must be valid at the time of admission. Multiple L.S.A.T. scores are averaged.

The L.S.A.T. Information Book (Canadian Service) may be picked up at the Faculty of Law or the Student Counselling and Resources Centre at the University of British Columbia, tel. (604) 228-3811. The Centre will mail the book for a fee. It may also be obtained by writing directly to L.S.A.S., Box 2000, Newtown, PA 18940, U.S.A.

Students applying to both American and Canadian law schools must use the American registration material which can only be obtained by writing directly to L.S.A.S.

Loans, Scholarships and Bursaries

The deadline for applying to the Awards Office for scholarships and financial aid is May 15. This applies even though an applicant may not have been admitted to the Law School prior to that date. The only exception to this is the Law Foundation Entrance Scholarship which may only be applied for by invitation after acceptance.

Admission Requirements

Enrolment in the Faculty of Law is limited to a total of 700 students. The number admitted to first year is, therefore, determined by the size of second and third years and is usually restricted to approximately 240 students. However, this number may be limited if the Faculty's resources and facilities are reduced.

Unless applicants fall into one of the special categories, mentioned below, letters of reference are not required. Regular applicants must satisfy one of the following requirements to be eligible for selection. An applicant must have:

(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 be currently 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 maintenance of an overall standing of not less than 65% or the equivalent.

The competition for places is such that much higher averages for undergraduate studies are required in order for an applicant to stand a reasonable chance of being admitted.

The median applicant accepted for 1989-90 had an academic average of approximately 77% with an L.S.A.T. score of 37. The academic average and L.S.A.T. score are used in a formula to determine an index number by which applicants are ranked. The academic average is weighted 60% and the L.S.A.T. 40%.

Admission Procedures

In calculating the academic average, only those years of undergraduate studies making up the first undergraduate degree that are complete at the time of the deadline for applications are considered.

Generally, no greater weight is attached to one series of academic courses or disciplines than to another. However, where a degree program includes activity or performance courses, greater weight will be given to the academic courses taken. Graduate degrees are not taken into account, except within the discretionary category discussed below.

A candidate who in the opinion of the Law Admissions Committee is deficient in English will be refused admission, regardless of academic record. Applicants may be required to take a test to demonstrate adequate facility with the English language.

The Discretionary Category

The Admissions Committee has the discretion to admit a limited number of applicants who lack the basic qualification for admission or who cannot match the standards of ordinary applicants. This category is designed to enable the Admissions Committee to respond to special circumstances. Physical disability and economic disadvantaged backgrounds may be taken into account, each case being considered individually on its merits. Applicants applying under this category should be B.C. residents.

Normal policy is to require an applicant seeking admission in this category to have completed at least two years of undergraduate or equivalent studies. Applicants are generally expected to be over the age of thirty. Exceptional circumstances, or achievements of the applicant, or physical disability, will be the decisive factors in this category. Work experience includes volunteer work in community or charitable organizations.

Persons who wish their applications to be considered within this discretionary category must set out in detail in a biographical résumé the special circumstances and/or achievements they wish to have considered in evaluating their application, with documentation where possible (e.g. medical reports, letters of reference, etc.).

Discretionary applicants must submit their application forms by the February 1 deadline date and must ensure that their biographical résumés, academic transcripts and letters of reference are submitted no later than March 31. It is the responsibility of each applicant to ensure that his or her file is complete.

Native Applicants

Native applicants are considered within the discretionary category. A special Native Law program has been instituted by the Faculty of Law. Native students considering application to Law School should contact the Director of the Native Law Program (228-6165) as early as possible in the academic year to discuss their situation in order to determine whether they should undertake further undergraduate work before applying to Law School. Generally native applicants are required to attend the two-month pre-law program for native students offered by the University of Saskatchewan College of Law in the summer months. For further information regarding this program applicants should write to the Director, Native Law Centre, University of Saskatchewan, Saskatoon, Saskatchewan S7N 0W0. The general policy of the Admissions Committee is to require a minimum of two years of undergraduate studies. Applicants are also required to write the L.S.A.T. In evaluating applicants, the Admissions Committee reviews the background, experience, undergraduate record, L.S.A.T. score and performance in the Saskatchewan program.

Advanced Standing and Unclassified

Graduates of, or students in, foreign law schools may apply to the Faculty of Law for advanced standing or unclassified status. A candidate who, in the opinion of the Law Admissions Committee, is deficient in English, will be refused admission or may be required to write a University test to determine proficiency in English. An admission of a student on advanced standing or unclassified status is solely within the discretion of the Law Admissions Committee. Decisions on these applications are usually not made prior to July when all such requests can be considered together. Applications in this category should be submitted by May 31.

(a) Advanced Standing

The policy of The University of British Columbia is that a student must complete two years of LL.B. studies at this institution before a degree will be granted. An applicant for advanced standing must also submit an L.S.A.T. score. In considering a request for advanced standing the Committee will consider the applicant's L.S.A.T. score, previous academic record, proficiency in English, and any other special circumstances which the candidate may wish to submit.

(b) Unclassified

An applicant who has a law degree or its U.B.C. equivalent from a foreign jurisdiction and who wishes to complete legal studies at U.B.C. in order to satisfy the certification requirements of the Joint Committee on Accreditation, may apply for unclassified status. An LL.B. degree will not be granted on completion of such studies. For admission purposes an applicant must satisfy the same requirements as listed above for the advanced standing applicant. Applicants must also have their credentials evaluated by the Joint Committee on Accreditation, Common Law Section, University of Ottawa, Ontario K1N 6N5 prior to application.

Transfer and 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 is solely within the discretion of the Admissions Committee. Decisions are not usually made until July when the applicant's official transcripts have been received. Each year there are many requests and only a few applicants can be accepted. Applications in this category should be submitted by May 31.

(a) Transfer

Students at other Canadian law schools requesting permission to transfer to the Faculty of Law for the LL.B. degree should demonstrate to the Committee (i) that they have achieved a satisfactory academic performance in their legal studies and (ii) that they have compelling reasons for transferring to The University of British Columbia. The Committee gives preference to those requests based on compassionate grounds where the applicant has no control over the circumstances involved, and to those applicants who would have been admitted into the first year of legal studies to this Faculty at the time of being admitted to their present institution. The L.S.A.T. score is also considered.

(b) 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 institution and who will be granted their LL.B. degree from that institution should demonstrate that they have achieved a strong academic performance in their legal studies. Compelling reasons based on compassionate grounds, pre-law and L.S.A.T. performance may be considered by the Committee.

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.

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 Legal Profession 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 in 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.

The Canadian Journal of Family Law

The Canadian Journal of Family Law is published at the University of British Columbia, Faculty of Law. It is a refereed publication issued semi-annually. Submissions made to the Journal are reviewed by qualified external readers, and the format includes articles, commentaries, and book reviews. In the past the Journal's subject matter has included writings on topics such as child welfare, evidentiary issues, child abuse, young offenders and other topics impacting on the family unit.

The Journal was started in 1978 and was published under the auspices of the Osgoode Law School in Ontario. In 1982-83 its publication base was moved to the U.B.C. Faculty of Law. It is the only student-run academic journal exclusively dedicated to the study, analysis and articulation of the increasingly important field of family law.

Students are encouraged to join the Journal staff by dropping by room 165 in the Curtis Building.

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 495 or 496 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.).

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 Faculty of Law or the Faculty of Graduate Studies at the University. Completed forms must be received by the Faculty of Law by March 31 preceding the academic year for which admission is sought.

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), M.S. (Pratt Institute).

Associate Professors:
TERENCE M. EASTWOOD, M.A. (Alberta), Dip.Ed. (Victoria).
JUDITH M. SALTMAN, B.A., B.L.S. (Brit. Col.), M.A. (Simmons).

Assistant Professors:
LUCIANA DURANTI, Dott. Lett., M.A.S. (Roma).
RICHARD L. HOPKINS, B.Ed., B.L.S., M.L.S., M.A. (Brit. Col.).
MARY SUE STEPHENSON, B.A. (Texas, Austin), M.L.S., Ph.D. (North Texas).

Instructors:
SYLVIA CROOKS, B.A., M.L.S. (Brit. Col.).
LYNNE LIGHTHALL, B.A. (Queen's), M.L.S. (Brit. Col.).

Part-time Lecturers:
BRYAN L. BACON, A.L.A.
ALEXANDRA E. BRADLEY, B.Ed. (Brit. Col.), B.L.S. (Alberta).
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).
DELLOYD JOHN GUTH, B.A. (Marquette) (Cantab.), M.A. (Creighton), Ph.D. (Pittsburgh).
JAMES FREDERICK HENDERSON, B.Sc. (Victoria), M.Sc. (Queen's), M.L.S. (Brit. Col.).
ALLEN SOROKA, B.A. (Columbia College, N.Y.), LL.B. (Virginia), M.L.S. (Columbia).

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.
DAVID J. ELKINS, B.A. (Yale), M.A., Ph.D. (Calif., Berkeley), Acting Dean, 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.
R. A. SPENCER, B.E., Ph.D. (Auckland), Registrar.
DIANA BROOME, B.A. (Calgary), M.L.S. (Brit. Col.), Librarian, Asia Pacific Foundation.
VIRGINIA CHISHOLM, B.Ed. (Brit. Col.), M.L.S. (Washington), Director, Douglas College Library.
TERENCE M. EASTWOOD, M.A. (Alberta), Dip.Ed. (Victoria).
RONALD JOBE, B.Ed. (Alberta), M.A., Ph.D. (Minnesota), Assistant Professor, Faculty of Education.
J. M. KENNEDY, M.A. (Toronto), Ph.D. (Princeton), Professor, Department of Computer Science.
J. L. LEIGH, B.Sc., M.Sc. (Brit. Col.), Director, University Computing Services.
PATRICIA MASKELL, B.A., B.Ed. (Manitoba), M.L.S. (Brit. Col.), Librarian, Crofton House School.
MARILYN MING, B.A. (San Diego State), Dip.Ed., M.L.S. (Alberta), Coordinator, Library Technicians' Programme, Vancouver Community College.
CRAIG C. PINDER, B.A. (Brit. Col.), M.A. (Minnesota), Ph.D. (Cornell), Faculty of Commerce and Business Administration.
G. G. E. SCUDDER, B.Sc. (Wales), D.Phil. (Oxon.) F.R.E.S., F.E.S.C., F.R.S.C., Professor and Head, Department of Zoology.
STAN SMITH, B.A. (Simon Fraser), M.A., M.L.S. (Toronto), Librarian, Surrey Public Library.
RICHARD W. UNGER, B.A. (Haverford), A.M. (Chicago), M.A., M. Phil., Ph.D. (Yale), Head, Department of History, Faculty of Arts.
REUBEN WARE, B.A. (Missouri), M.A. (Boston), Deputy Provincial Archivist, British Columbia Archives and Records Service.
WILLIAM J. WATSON, B.J. (Carleton), B.L.S., M.A. (McGill), Acting University Librarian.

THE SCHOOL OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES

Purpose and History of the School

The School offers two separate programs, one leading to the Master of Library Science, the other to the Master of Archival 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.

While the School cannot guarantee positions to its graduates, it assists them in attempting to find employment suited to their aptitudes and interests.

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 reaccredited 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.

Facilities

Location.—The School of Library, Archival and Information Studies is located on the top floor of the North Wing of the Main Library.

Library Resources.—The University of British Columbia Library is the largest in Western Canada. Its total resources comprise over 2,500,000 volumes and an even larger number of items in microform, sound and video recordings, ad other media, with special strength in bibliographies, reference works and serials. The collection in the field of library, archival and information studies alone now numbers over 20,000 titles, and some 20,000 contemporary and historical children's books are available. The library's holdings of archival collections are extensive, and include the University Archives. The library is also one of the most highly computerized in North America.

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.

Admissions Procedures

1. Enquiries and applications for admission should be addressed to the Admissions Committee 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. The deadline for applications is March 1 for the following September.

All new applicants are charged an application fee of $15.00 (plus an additional $10.00 if out-of-province documents are submitted). This fee must accompany the application for admission form when submitted with supporting documents. The fee is nonrefundable 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

A working knowledge of languages is of the greatest benefit in the work of the information professional, because the job requires working with documents and bibliographic data in many languages. Therefore, some ability to deal with a language other than English is a prerequisite for admission to both the M.L.S. and the M.A.S. programs. This requirement may be met by:

(a) Presentation of evidence showing at least the equivalent of six units of credit at the university level in the study of a language (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 by July 31 of the year of enrolment. Knowledge of a computer language, while very useful to the information professional, is not accepted as equivalent to knowledge of a natural language.

Where the native language of the applicant for admission is not English, demonstrated facility in both the oral comprehension and the writing of English is also a prerequisite for admission. The Admissions Committee will generally consider the results obtained on standard tests for this purpose.

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 may continue in the M.L.S. program if an overall average of 70% is obtained in the 500-level courses of the core program, and if no individual courses are failed; and if an overall average of 70% is maintained through the rest of the program.
2. A student may continue in the M.A.S. program if an overall average of 70% is obtained in the required ARST 500-level courses of the first term of the first year, and if no individual course is failed; and if an overall average of 70% is maintained through the rest of the program.
3. Courses will be graded as follows: 1st class: 80% and 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. The same provision applies to an elective course, but in this case an alternate course may be taken. A course in which a grade of less than 70% was obtained may be repeated for a higher standing if recommended by the School. Supplemental examinations will not be granted.
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.

Instructional Pattern

Methods.—The School employs a wide variety of instructional methods 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.

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.

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.—Because the academic load of the School is heavy, it is recommended that students limit their part-time work to ten hours a week or less. All inquiries for part-time work at the University should be directed to the Canada Employment Centre, Brock Hall.

Attendance.—Regular attendance is expected of students in all their classes. A student who cannot attend classes, field trips, etc., should notify the instructor concerned in writing.

Assignments.—It is expected that the student will have developed facility in typing before entering the School, because work is normally submitted in typewritten form, and because the student will be required to make efficient use of computer terminals.

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.

Awards not administered by Awards and Financial Aid are listed in the School's information brochure.

MASTER OF LIBRARY SCIENCE

The Nature of the Library and Information Professions

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 those with the M.L.S. degree 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 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 possess a Bachelor's degree from a recognized university in a discipline acceptable to the Admissions Committee of the School;
   (b) must have achieved a good 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.
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 a career in this field should consult the School about their courses. Interviews may be arranged at any time.

A broad cultural background is expected of all prospective information professionals, and students should therefore, in the first and second undergraduate years, select elective 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 career interest. 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.

Librarians and information professionals are required to work with documents and bibliographic data in many languages. Students are advised to acquire a working knowledge of at least one major language other than English.

Basic courses in statistics and computer science are also recommended.

Requirements for the Degree

1. Entrants without a previous librarianship qualification:

Students undertaking their first professional degree in library and information studies must complete at least thirty units of credit courses approved by the School 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 Term 1, during which the student will take five required courses representing the knowlege that should be common to all librarians. At the conclusion of these courses examinations will be conducted which together will constitute a comprehensive examination. No other course may be begun for credit toward the degree until these courses have been successfully completed.

In Term 2 of the first year or in later years students are required to take LIBR 600, 623, 654, and either 640 or 649. Together, these required courses are credited with 13½ units. The remaining 16½ units needed to complete the degree will be chosen from the list of elective courses, in consultation with the student's faculty adviser to ensure proper sequencing and a balanced program.

Students are advised to take 15 units during the first year, thus completing half their program. The remaining 15 units need not be started immediately thereafter, and may be taken on a part-time basis.

All degree requirements must be met within a period of five years after initial registration.

Sequence of Required Courses

First Year, Term 1	**Units**
LIBR 500: Reference and Information Services I	1½
LIBR 505: Organization of Published Information	1½
LIBR 510: Library Collections and Communities	1½
LIBR 515: The Information Professions	1½
LIBR 520: The Technologies of Information Transfer	1½
First Year, Term 2 or Later Years	
LIBR 600: Reference and Information Services II	1½
LIBR 623: Descriptive Cataloguing	1½
LIBR 640: Management of Libraries and Archives	1½
or	
LIBR 629: Topics in the Management of Libraries and Archives	
LIBR 654: Research Methods in Libraries and Archives	1½
Elective Courses	16½
Total	30

All elective courses must be chosen in consultation with the student's faculty adviser to ensure proper sequencing and a balanced program. Courses other than those designated as LIBR at this University may be applied to the M.L.S. program, whether taken at this or another institution; they may, however, total no more than six units of the required thirty. Permission to apply such courses for credit must be obtained in advance from the School; any such course must be at the 300 level or above, or the equivalent at other institutions. Granting of permission will be based on the direct relevance of the course(s) to the individual's work in the M.L.S. program.

2. Entrants who already possess a librarianship qualification:

Students already holding an acceptable qualification in librarianship may be admitted at the beginning of any term. They must complete at least fifteen units of credit chosen under the guidance of the student's adviser. On application to the Director, some credit may be granted for LIBR courses taken at this School prior to admission to the M.L.S. program but not yet credited toward a degree. Other courses may be credited as stated under (1) above; they may, however, total no more than three units of the required 15. At the School's discretion, if the earlier qualification 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 students are admitted with a B.L.S. from the University of British Columbia, the program may be completed by part-time study. Where any other librarianship qualification is the basis for admission, the student must be engaged in full-time studies at UBC for at least one term of 7½ units.

Field Work

Field experience in a library is a prerequisite for entry into the elective part of the program, providing the student with directed experience under actual library operating conditions. The field work normally takes place during the first two weeks of January in the student's first year, and is arranged by the School after consultation with the student. 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, all M.L.S. students must complete the core program before enroling in 600-level courses. 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.

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 the Archival Profession

Archives preserve the records created by public and private bodies in the normal course of their activities and make those records available for a broad range of societal purposes including scholarly research. As such, archives are an important agency of many modern administrations (governments, business, churches, universities, etc.) and vital institutions in the preservation of the Canadian documentary heritage. The role of archivists is to plan and implement programs to appraise, acquire, preserve, and make available records of enduring value to society.

Archivists' work increasingly involves them in promoting and administering systematic management of records throughout their life cycle, in acquisition of a broad range of materials of all media, in a complex of legal and regulatory concerns, and in application of automation to problems of retrieving information from archives. Thus, while maintaining close links with the study of history, professional archival studies also have interdisciplinary links with administrative studies, legal studies, media and communication studies, and library and information studies.

Undergraduate Preparation

Undergraduate students who are considering working in the field of archives should consult the School about their choice of courses. Interviews may be arranged at any time.

A broad cultural background is expected of all prospective archivists. Students should therefore endeavor to acquaint themselves with the humanities, social sciences, and sciences during their undergraduate studies. However, because of the close link between archives and historical studies of all kinds, prospective students should acquaint themselves especially with history and allied disciplines which take an historical perspective such as anthropology, economics, geography, and sociology. Some background in the study of Canadian history is extremely helpful as preparation for a number of the required courses of the program. Applicants are therefore advised to have successfully completed at least two full-year courses in Canadian history at the undergraduate level.

A reading knowledge of other languages is useful in many areas of archival work and is sometimes required. An ability to deal with a language other than English is a prerequisite for entry into the M.A.S. program (see *Language Requirement*, above). However, 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.

Admission

Candidates for admission to the program:

1. must possess a 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;
2. must have achieved a good second-class standing in the last two years of undergraduate study;
3. must show promise of superior professional performance as attested by letters of reference and a personal interview;
4. must fulfil the language requirement described above.

Requirements for the Degree

The Master's degree is awarded on the completion of 30 units of work. The program must begin in the fall term, and the first year requires full-time attendance.

All courses in the first year are required: ARST 500, 501, 502, 503, 504, 505, 510, 520 and HIST 545. An elective course may be substituted for HIST 545 by students who hold a graduate degree in Canadian history or who have successfully completed at least 12 units of Canadian history at the advanced undergraduate level. Successful completion of 500-level courses is a prerequisite for admission to 600-level courses.

The required Practicum, ARST 600, is carried out between the first and second years. In the second year, ARST 620: Thesis, is required. All other courses are elective, and must be chosen in consultation with the student's faculty adviser.

Courses other than those designated as ARST at this University, up to a value of nine units, may be applied to the M.A.S. program, whether taken at this or another institution. Permission to apply such courses for credit must be obtained in advance from the School; any such course must be at the 300-level or above, or the equivalent at other institutions. Granting of permission will be based on the direct relevance of the course(s) to the individual's work in the M.A.S. program.

All degree requirements must be met within five years of initial registration.

Sequence of Required Courses

First Year, Term 1	**Units**
ARST 500: Fundamentals of Archives I	1½
ARST 501: Organization and Administration of Archival Institutions	1½
ARST 504: Description and Indexing of Archives	1½
ARST 505: Government Records in Canada	1½
HIST 545: Canadian Historiography and Historical Methods	
First Year, Term 2	
ARST 502: Fundamentals of Archives II	1½
ARST 503: Reference Service and Access to Archives	1½
ARST 510: Records Management	1½
ARST 520: Automation and Archives	1½
HIST 545: Canadian Historiography and Historical Methods	3
Subtotal	15
Second Year	
ARST 600: Practicum	1½
ARST 620: Thesis	6
Electives	7½
Total	30

The Practicum will be at an archival repository approved by the School and will be carried out between the first and second year of study, following successful completion of all 500-level courses.

A thesis advisory committee will be established at the beginning of the second year for each student to assist in the selection of a topic, to approve the thesis proposal, to guide the student during its development and to act as examiners upon its completion.

Examples of elective courses which would be permitted

ARST 601: Diplomatics	1½
ARST 602: Elements of Law for Archivists	1½
ARST 605: Archival Information Retrieval	1½
ARST 610: Preventive Conservation of Materials	1½
ARST 611: Specialized Archives	1½
ARST 614: Advanced Seminar	1½
ARST 615: Directed Study	1½
COMM 457: Introduction to Financial Accounting	1½
ECON 336: Economic History of Canada	3
ENGL 420: Canadian Literature	3
GEOG 327: Historical Geography of Canada, I: Before 1850	1½
GEOG 328: Historical Geography of Canada, II: 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 640: Management of Libraries and Archives	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

THE FACULTY OF MEDICINE

ACADEMIC STAFF

Office of The Dean

WILLIAM A. WEBBER, M.D. (Brit. Col.), FRCPC, Professor of Anatomy and Dean of the Faculty (to June 30, 1990).
MARTIN J. HOLLENBERG, B.Sc., M.D. (Manitoba), M.Sc., Ph.D. (Wayne State), FRCPC, Professor of Anatomy and Ophthalmology and Dean of the Faculty (from July 1, 1990).
BERNARD H. BRESSLER, B.Sc. (Sir Geo. Williams), M.Sc., Ph.D. (Manitoba), Associate Professor of Anatomy, Associate Dean, Administration.
JAMES E. CARTER, M.B., Ch.B. (Cape Town), FRCPC, Associate Professor of Paediatrics, and Associate Dean, Admissions.
A. DOUGLAS COURTEMANCHE, M.D. (Tor.), F.R.C.S.C., Clinical Professor of Surgery and Associate Dean, Residency Training.
ANDREW A. EISEN, M.D., M.R.C.S., L.R.C.P. (Leeds), FRCPC, Professor of Medicine, Associate Dean, Research and Graduate Studies.
ROLAND W. LAUENER, M.D. (Brit. Col.), FRCPC, Professor of Medicine (Part-time) and Associate Dean, Undergraduate Education.
DAVID S. LIRENMAN, B.Sc., M.D. (Manitoba), FRCPC, F.A.C.P., Professor of Paediatrics, Associate Dean and Director of Continuing Medical Education.

Division of Continuing Medical Education

IAN TSANG, M.B. (Taiwan), FRCPC, Clinical Associate Professor of Medicine, Acting Associate Dean and Acting Director.
JENNIFER L. CRAIG, B.S.N., M.A. (Brit. Col.), Ph.D. (McGill), Assistant Director, Research and Evaluation.

Division of the History of Medicine and Science

JOHN M. NORRIS, B.A., M.A. (Brit. Col.), Ph.D. (Northwestern), Professor and Director of the Division (to June 30, 1990).
DAVID V. BATES, M.D. (Cantab.), F.R.C.P. (London), F.R.S.(C), FRCPC, F.A.C.P., Honorary Lecturer.
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MAURICE D. YOUNG, B.A., M.A., M.B., B.Ch. (Cantab.), F.R.C.P., FRCPC, Professor (part-time).

Department of Anaesthesiology

L. C. JENKINS, B.A., M.D., C.M. (McGill), FRCPC, Professor and Head of the Department.
R. L. D. ADAMS, M.D. (Alta.), FRCPC, Clinical Instructor.
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J. H. HAY, M.B., B.Chir. (Cantab), M.R.C.P., D.M.R.T., F.R.C.R., Clinical Assistant Professor.
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DAVID G. HUNT, M.D. (Brit. Col.), Clinical Assistant Professor.
KARSTEN IVERSEN, C.M. (Copenhagen), FRCSC, Clinical Assistant Professor.
S. M. JACKSON, M.B., Ch.B., M.D. (Manchester), D.M.R.T. (London), F.F.R. (London), FRCPC, Clinical Professor and Head of the Division of Radiation Oncology.

W. R. E. JAMIESON, B.A. (New Brunswick), M.D. (Dal.), FRCSC, Clinical Professor.
MICHAEL T. JANUSZ, M.D. (Manitoba), FRCSC, Clinical Assistant Professor.
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P. A. MacKAY, B.A., M.D., C.M. (McGill), FRCSC, Clinical Associate Professor.
F. C. MALBY, M.D. (Queen's), FRCSC, Clinical Instructor.
M. F. MANJI, M.B., Ch.B. (Makerere), D.M.R.T. (Toronto), FRCPC, Clinical Assistant Professor.
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MARK MELOCHE, M.D. (W. Ont.), FRCSC (Brit. Col.), Assistant Professor.
RUA R. MERCIER, M.B. (Otago, N.Z.), FRCPC, Clinical Instructor.
BARRY J. MILLER, M.D. (Western Ont.), Clinical Assistant Professor.
D. R. MINTZ, M.D., FRCSC, Clinical Assistant Professor.
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ALEXANDER B. MORRISON, Ph.D., M.B., B.S. (Univ. College, England), Clinical Assistant Professor.
M. D. MORRISON, M.D. (Sask.), FRCSC, Professor.
DOUGLAS M. MOSELEY, M.D. (Brit. Col.), Clinical Instructor.
R. J. MULLER, M.D. (Dalhousie), Clinical Instructor.
A. IAN MUNRO, M.B., B.S. (London), F.R.C.S. (England), FRCSC, Clinical Associate Professor.
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A. G. NAGY, B.Sc. (Loyola), M.D. (Ottawa), FRCSC, Clinical Assistant Professor.
BILL NELEMS, B.A.Sc., M.D. (Tor.), FRCSC, Associate Professor.
M. NIGRO, M.D. (Alta.), F.R.C.C.(C), Clinical Assistant Professor.
BRIAN OLDRING, M.D. (Alta.), Clinical Assistant Professor.
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P. J. O'REGAN, M.B., Ch.B., B.A.O. (N. U. Ireland), FRCSC, Clinical Assistant Professor.
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ROY A. PURSSELL, M.D. (Brit. Col.), E.M.R.C. (McGill), Clinical Assistant Professor.
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LESLEY J. SALKELD, M.B., Ch.B. (New Zealand), FRCSC, F.A.C.S., F.R.A.C.S.O, Clinical Assistant Professor.
A. J. SALVIAN, M.D. (Ontario), FRCSC, Clinical Assistant Professor.
J. T. M. SANDY, M.D. (West. Ont.), FRCSC, F.A.C.S., Clinical Professor.
ROBERT SAUNDERS, M.D. (Dalhousie), Clinical Assistant Professor.
NIS SCHMIDT, M.D., M.Sc. (Alta.), FRCSC, Clinical Professor.
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D. W. F. SCHWARZ, M.D. (Freiburg), Dr. Med. (Germany), Professor.
C. H. SCUDAMORE, B.Sc., M.Sc., M.D. (Brit. Col.), F.A.C.S., FRCSC, F.R.C.S. (Ed.), F.R.C.S. (Eng.), Assistant Professor.
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GLEN W. SMITH, B.S.P., M.D. (Brit. Col.), M.Sc., FRCSC, Clinical Associate Professor.
J. MICHAEL SMITH, M.B., B.Ch., FRCSC, Clinical Instructor.
C. F. T. SNELLING, M.D. (Toronto), FRCSC, Professor and Director of Computer Services.
Q. R. SON-HING, M.B., Ch.B. (Cape Town), FRCSC, Clinical Associate Professor.
P. STEINBOK, B.Sc. (Newcastle-upon-Tyne), M.B., B.S. (W. Indies), FRCSC, Clinical Assistant Professor.
H. STEVENS, M.D. (Toronto), FRCSC, Instructor (part-time).
IRWIN F. STEWART, B.A., M.D. (Brit. Col.), FRCSC, Clinical Professor.
J. L. STOLLER, M.B., Ch.B. (St. Andrew's), FRCSC, F.R.C.S.(Ed.), Clinical Professor, Head, Division of General Surgery at Vancouver General Hospital.
R. M. STREET, M.D. (Memorial), Clinical Instructor.
LORNE D. SULLIVAN, M.D. (Sask.), FRCSC, Clinical Professor.
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W. N. TAYLOR, M.B., B.Ch. (Witwatersrand, S.A.), F.R.C.S. (Edinburgh), FRCSC, Clinical Instructor.
GORDON B. THOMPSON, B.Sc. (Manitoba), M.D., C.M. (McGill), FRCSC, F.A.C.S., Professor (part-time) and Head of Division of Neurosurgery.
R. P. THOMPSON, M.D. (Sask.), FRCSC, Clinical Assistant Professor.
N. CHEE THONG, M.B., F.R.C.S.(I) (Ireland), FRCSC, Clinical Assistant Professor.
I. M. TURNBULL, M.D. (Brit. Col.), FRCSC, Associate Professor and Director of Undergraduate Training.
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G. F. O. TYERS, M.D. (Brit. Col), FRCSC, F.A.C.S., Professor and Head of the Division of Cardiovascular and Thoracic Surgery.

LESLIE VERTESI, M.D. (Toronto), Clinical Assistant Professor.
J. A. VESTRUP, M.D. (Brit. Col.), FRCSC, Assistant Professor.
N. J. S. VOSS, L.R.C.P., M.R.C.S., D.M.R.T., F.R.C.R. (England), FRCSC, Clinical Assistant Professor.
R. M. WALLS, M.D. (Brit. Col.), FRCPC, F.A.C. Emerg.P., Associate Professor (part-time).
R. J. WARREN, M.D. (Brit. Col.), FRCSC, Clinical Assistant Professor.
R. A. WHITE, B.A. (Brit. Col.), M.Sc. (Minnesota), M.D. (Wash.), FRCSC, Clinical Assistant Professor.
F. L.-W. WONG, B.Sc., M.D. (Brit. Col.), FRCPC, Clinical Assistant Professor.
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W. B. WOODHURST, M.D. (Brit. Col.), FRCSC, Clinical Assistant Professor.
J. E. WRIGHT, M.D. (Alta.), FRCSC, Clinical Associate Professor.
R. YOUNGER, M.D. (Alta.), FRCSC, Clinical Instructor.
PAUL A. ZICKLER, M.D. (Western Ont.), Clinical Instructor.

Division of Cardiovascular and Thoracic Surgery
G. F. O. Tyers, Head; Philip G. Ashmore, L. H. Burr, K. G. Evans, G. Fradet, A. N. Gerein, V. Gudas, Robert Hayden, W. R. E. Jamieson, Michael T. Janusz, Jacques LeBlanc, H. Ling, R. T. Miyaghishima, A. Ian Munro, Bill Nelems, K. Qayumi, H. Tutassaura.

Emergency Room Physicians
Paul Assad, James D. Cameron, B. A. Campana, John M. Carthy, A. F. Chou, James M. Christenson, Stephen Day, Michael S. Dettman, Gilbert Dyck, Sheldon Glazer, Lois E. Graham, D. G. Halpenny, D. Hunt, V. P. J. Krajina, William J. Lang, T. F. S. Lee, D. Londorf, Donald C. MacDonald, R. B. Matthews, J. McEwen, R. R. Mercier, Barry J. Miller, Alexander B. Morrison, Douglas M. Moseley, R. J. Muller, Brian Oldring, Roy A. Purssell, Robert Saunders, Donald H. Schreiber, R. M. Street, Leslie Vertesi, R. M. Walls, Victor Wood, Paul A. Zickler.

Division of General Surgery
J. K. MacFarlane, Head; D. B. Allardyce, K. G. Atkinson, R. M. Baird, R. M. Christensen, M. G. Clay, I. G. M. Cleator, N. L. Davis, A. D. Forward, Alan Groves, R. J. Hancock, K. Iversen, Urve Kuusk, H. Laimon, Gregor I. McGregor, M. Meloche, A. G. Nagy, P. J. O'Regan, Michael E. Pezim, P. T. Phang, P. M. Rebbeck, R. E. Robins, J. T. M. Sandy, Nis Schmidt, C. H. Scudamore, A. M. Seal, C. Shackleton, F. R. Sharp, J. L. Stoller, J. A. Vestrup, R. A. White.

Section of Paediatric General Surgery
Geoffrey Blair, G. C. Fraser.

Division of Neurosurgery
Gordon B. Thompson, Head; M. C. Boyd, D. D. Cochrane, F. Durity, D. J. Fairholm, D. E. Griesdale, P. J. Murray, P. Steinbok, I. M. Turnbull, W. B. Woodhurst.

Division of Otorhinolaryngology
P. J. Doyle, Head; Donald W. Anderson, M. P. Banno, Andris Blokmanis, F. G. Braig, Robert I. Dickson, J. R. Dmytryshyn, K. R. Dubeta, Scott Durham, D. A. Gillanders, R. E. G. Gosling, D. Klassen, A. K. Y. Leung, N. S. Longridge, F. C. Malby, R. A. McNeill, D. R. Mintz, T. M. Mitchell, M. D. Morrison, William J. Patterson, K. H. Riding, M. A. Ross, E. F. J. Rueben, Lesley J. Salkeld, D. W. F. Schwarz, E. G. N. Sinanan, Glen W. Smith, J. Michael Smith, H. Stevens, Irwin F. Stewart, N. Chee Thong, R. Younger, J. Woodham.

Division of Plastic Surgery
Albert D. Courtemanche, Head; J. Boyle, D. G. Fitzpatrick, B. Foley, D. A. Kester, P. A. MacKay, C. F. T. Snelling, Q. R. Son-Hing, R. P. Thompson, R. J. Warren.

Division of Radiation Oncology
S. M. Jackson, Head; B. A. Acker, Vivien Basco, Peter Coy, G. Duncan, R. N. Fairey, A. D. Flores, G. B. Goodman, A. C. Grafton, J. H. Hay, E. C. Kostashuk, Charles M. Ludgate, M. F. Manji, I. A. Olivotto, D. Rheaume, N. J. S. Voss, F. L.-W. Wong.

Division of Urology
E. W. Ramsey, Head; G. J. Ankenman, Nicholas Bruchovsky, S. L. Chan, G. U. Coleman, H. N. Fenster, S. L. Goldenberg, H. W. Johnson, L. Lee, A. D. C. Manson, J. Masterson, Martin McLoughlin, A. J. Moore, M. Nigro, Z. Perler, Paul Rennie, Lorne D. Sullivan, W. N. Taylor, J. E. Wright.

Division of Vascular Surgery
H. K. Litherland, Acting Head; L. Doyle, Peter D. Fry, H. D. Hildebrand, York Hsiang, T. M. Maxwell, J. Reid, A. J. Salvian, Joseph G. Sladen, D. C. Taylor.

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 37 weeks duration, including three weeks of examinations, a study week and one week of vacation. The first term is 16 weeks in length, comprising 15 instructional weeks and one week of examinations at term end. The second term is divided into two phases. Phase I is 13 weeks in length, comprising 10 instructional weeks, a study week, an examination week and one week's vacation. Phase II is seven weeks in length, comprising six instructional weeks and one week of final examinations. The second year is of 35 weeks duration, consisting of 32 instructional weeks, with one week of examination prior to Christmas break and two examination weeks at year end. The third year is of 33 weeks duration including one week of examinations. The final year is of 49 weeks duration including 2 weeks vacation.

In first year, 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, students are also introduced to patient care through Family Practice 401 and a Clinical Skills course. An awareness of the social issues in medicine is fostered, as is the history of the health sciences. Anatomy, biochemistry and physiology conclude at the end of the first phase; general pathology and medical microbiology start in phase two in a transition from normal to abnormal physiology concluding at the end of the second phase of first year. In 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 year. This enables an integrated system approach to clinical medicine to be started at the beginning of second year and to continue through the remainder of the curriculum. 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. 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 and clinical departments 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 of six 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 students so desire, they may present their own elective programs to the Faculty for approval.

During the program sufficient time for independent study has been set aside to allow and encourage students to take responsibility for their 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 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, Royal Columbian 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* Mathematics 100 (Calculus I) and Statistics 105 or 203 (Descriptive and Elementary Inferential Statistics) *OR* Mathematics 120 (Differential Calculus) and Mathematics 121 (Integral Calculus).
(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 *OR* 103 (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 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.

Admission to the M.D. Program

Applications from individuals already holding an M.D. degree or its equivalent will not normally be considered.

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 take an extra year of studies 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 successful 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 program will be notified of registration procedures.

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 1989 costs.)

First Year:	**Approximate Price**
Microscope—an approved model	$700.00-$1,200.00
Instruments for anatomy and physiology	$25.00
Stethoscope	$100.00
Laboratory coats (4)	$100.00

Second Year:	
Ophthalmoscope with otolaryngological attachments	$299.00
Sphygmomanometer	$90.00
Percussion Hammer	$10.00
Tuning Forks	$30.00

Textbooks

Information regarding textbooks will be given at the first class period in each course. Not less than $500.00 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, Parasitology, Introduction to Clinical Practice, Clinical Skills teaching (Interviewing and Physical Examination of the Normal), Medical Ethics, Behavioural Sciences in Medical 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:

Interdepartmental Clinical Skills Courses emphasizing history taking and examination of the abnormal (Medicine, Surgery, Paediatrics, Obstetrics and Gynaecology, Psychiatry), Medical Genetics, Medical Microbiology, Neuroanatomy, Neurophysiology, Health Care and Epidemiology, Pathology, Pharmacology, electives.

Third Year:

Medicine, Obstetrics and Gynaecology, Ophthalmology, Paediatrics, Psychiatry, Diagnostic Radiology, Surgery (including sub-specialties), Anaesthesiology, and electives. There is a block format in the third year timetable which includes a four-week elective period as the final rotation.

Fourth Year (Clinical Clerkship):

Medicine (including subspecialities), 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, Clinical Skills I, Family Practice, Medical Ethics, and Behavioural Sciences in Medicine.

Second Year:

Anatomy (Neuroanatomy), Medicine, Paediatrics, Obstetrics, Psychiatry, Medical Microbiology, Pathology, Pharmacology, Physiology (Neurophysiology), Medical Genetics, and Clinical Skills II.

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; Electives; Health Care and Epidemiology; Medicine; Therapeutics; 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.

Postgraduate 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 practise, 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 July 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 minimum 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.

Community Medicine

Postgraduate 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.

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. A one-year training program in emergency medicine is offered.

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, one year in an elective program approved by the director, and one year of approved clinical training.

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, University Hospital-Shaughnessy Site and the W. Koerner Acute Care Unit of the University Hospital-U.B.C. Site. 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

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' experience in the division of nuclear medicine at the Vancouver General Hospital, St. Paul's Hospital, Children's Hospital and the University Hospital-U.B.C. Site. 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.

Orthopaedics

Minimum requirements comprise 12 months training in the Principles of Surgery common to all surgical practice by rotations through appropriate surgical services, followed by 36 months training and experience in all areas of Orthopaedic Surgery including: (1) Adult Reconstructive Surgery, Adult Trauma, Hand Surgery, Orthopaedic Oncology, Intensive Care Unit at Vancouver General Hospital; (2) Paediatric Orthopaedics and Trauma at Children's Hospital; (3) Spinal Cord Injuries and Back Pain Management at University Hospital-Shaughnessy Site; (4) Arthroscopic and Sports-related Surgery at the W. Koerner Acute Care Unit of the University Hospital-U.B.C. Site; (5) General Orthopaedics and Trauma at Royal Columbian Hospital, New Westminster; (6) General Orthopaedics at St. Paul's Hospital. An additional requirement comprises 12 months advanced clinical experience, or research and teaching by arrangement with the Department of Anatomy.

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 fulfil 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 in-patient and out-patient 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.

Radiation Oncology (Cancer Control Agency of B.C.)

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.

Radiology

The postgraduate program in Radiology is a four-year program fully approved for certification and fellowship in the Royal College of Physicians and Surgeons of Canada. The first year provides core training in physics, chest radiology gastrointestinal radiology, genitourinary radiology, musculoskeletal radiology, neuroradiology, computed tomography and ultrasound. During the second year the resident consolidates skills in film interpretation and the basic procedures by functioning as a general radiologist under appropriate supervision. A three month block of paediatric radiology is also included. During the third and fourth years, rotations are provided in nuclear medicine, angiography, oncologic radiology, and magnetic resonance imaging. Assuming that the Royal College requirements are satisfied, the last two years provide opportunities for the resident to develop special expertise in any of the subspecialty areas or to develop a full-time research project. Residents are on-call to read emergency films. The academic program consists of daily rounds, weekly grand rounds and resident seminars during the academic year, a four year rotating series of core seminars, and a series of five or six internationally known visiting professors. Residents in their first and third years are expected to complete a research project, and residents in their second and fourth years are expected to present a grand round.

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
Emergency Medicine
General Surgery (including vascular surgery)
Neurosurgery
Otorhinolaryngology
Paediatric General Surgery
Plastic Surgery
Urology.

Vascular Surgery

The objective of this program is to provide training in Vascular Surgery for graduate physicians interested in a career in Vascular Surgery. The program has been reviewed and approved by the Executive Committee of the Faculty of Residency Training Committee. The program has been designed to meet the guidelines of the Royal College of Physicians and Surgeons of Canada and approval of this body is required before this program will begin.

Prerequisite for entry into the program is completion of the Royal College Certification requirements in general surgery which must have included at least three months of training in a vascular surgery unit or six months of training in a mixed vascular and general surgical unit.

The program consists of twelve months of training in peripheral vascular surgery in the vascular surgery unit of the University Hospital-U.B.C. Site, Vancouver General Hospital and St. Paul's Hospital.

The program director will be Dr. P. D. Fry with the Department of Surgery 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 Training Committee as well as by the Royal College at the time of its site visits every five or six years.

On completion of the program trainees will be expected to complete the Royal College examinations in the specialty of Vascular Surgery.

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, toxicology, 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.

Students should note that the B.M.L.Sc. degree program does **not** qualify students for the Canadian Society of Laboratory Technologists (R.T.) (general) diploma.

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.

Prerequisites

1. Graduation 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, **and**
2. graduation with the Canadian Society of Laboratory Technologists (R.T.) (general) diploma, **and**
3. credit in either:
   (a) Chemistry 230 (or its equivalent) plus one of Chemistry 205, Chemistry 201 or any other second year level physical chemistry course.

OR

   (b) Chemistry 230 (or its equivalent) and 3 units of arts electives.

Candidates admitted under option (b) must complete Chemistry 205 in the first year of the program.

Applications will be considered from Science undergraduates or graduates who have passed the following courses or their equivalents: BIOL 101 or 102, 200, 201; CHEM 110 or 120, 205, 230; ENGL 100; MATH 100, 101 (120, 121); MICB 200; PHYS 110, 115 or 120 and an Arts elective (3 units). Successful applicants must pass PATH 230 and PATH 300 during the first session following entry.

English Composition Requirement

In order to graduate from the program candidates must have completed either English 100 (or equivalent) **OR** the English Composition Test. Enquiries should be directed to the Department of Pathology, tel. 228-7088 or 228-7108.

Application and Registration

Any enquiries should be addressed to:

B.M.L.Sc. Coordinator,
Department of Academic Pathology
The University of British Columbia,
Ground Floor, Room 227
Acute Care Hospital
2211 Wesbrook Mall
Vancouver, B.C. V6T 1W5

PROGRAM

Third Year

Instrumental Analysis	CHEM	311
Bacteriology, Mycology, Virology and Parasitology	PATH	427
Background to Medical Laboratory Science	PATH	300
Introduction to Medical Laboratory Science	PATH	301
Nuclear Medicine for M.L.Sc.	PATH	306
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	3 units	

Fourth Year

Statistics in the Health Sciences	BIOL 300 OR HCEP	400
Clinical Chemistry	PATH	406
Analytical, Clinical and Forensic Toxicology	PATH	407
Haematology	PATH	402
Laboratory Administration	PATH	408
Histochemistry	PATH	404
Immunopathology	PATH	415
Seminars in Current Topics	PATH	405
An Arts elective	3 units	

Note: An optional elective, PATH 438 (1-3 units), is available to students in Fourth Year.

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, Rm. 101, General Services Administration Building, The University of British Columbia, 2075 Wesbrook Mall, Vancouver, British Columbia. V6T 1W5. (Telephone 228-5111).

THE SCHOOL OF MUSIC

(A School within the Faculty of Arts)

ACADEMIC STAFF

Professor and Director of the School

WILLIAM E. BENJAMIN, B. Mus. (McGill), M.F.A., Ph.D. (Princeton).

Professors

MARTIN C. BERINBAUM, B.S. in Trumpet and Music Ed. (Southern California), M.S. in Trumpet (Juilliard School of Music).
WALLACE BERRY, B.Mus., Ph.D. (Southern California).
GREGORY G. BUTLER, B.Mus. (McGill), M.A., Ph.D. (Toronto).
STEPHEN G. CHATMAN, B.Mus. (Oberlin), M.M., D.M.A. (Michigan).
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 University of America).
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

ALEXANDRA J. BROWNING-MOORE, A.T.C.M. (Toronto Conservatory of Music), B.Mus. (Brit. Col.)
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).
GERALD STANICK.
DOUGLAS E. TALNEY, B.Mus. (Lewis and Clark), M.Mus. (Southern California).
ERIC J. WILSON, B.Mus., M.Mus. (Juilliard).
EUGENE N. WILSON, B.Mus. (Southern California), M.A., Ph.D. (Washington).

Assistant Professors

KEITH HAMEL, B.Mus. (Queen's), A.M., Ph.D. (Harvard).
GEOFFREY MICHAELS, Diploma (Curtis Institute).
VERA MICZNIK, Diploma (Bucharest Conservatory), M.A. (Virginia), Ph.D. (SUNY, Stony Brook).
JOHN B. ROEDER, B.A. (Harvard), Ph.D. (Yale).
RENA SHARON, B.Mus., M.Mus. (Indiana).
ALAN THRASHER, A.A. (Valley Forge Jr. College), B.S. (Mansfield State College), M.M. (Ithaca College), Ph.D. (Wesleyan).

Adjunct Professor

KUM SING LEE, Diploma (Hochschule für Musik, Berlin), M.Mus. (Rosary College, Villa Schifanoia, Florence), L.R.S.M., L.Mus. A. (Australia).

Part-time Lecturers

MICHAEL BAKER, A.L.C.M. (Associate London College), B.Mus. (Brit. Col.), M.A. (Western Washington).—Composition, Film music.
DAVID A. BRANTER, M.M. (Indiana).—Saxophone.
EILEEN BROADIE-FEAY, B.Mus.Ed., M.Mus. (Wichita State).—Voice.
GORDON CHERRY, B.Mus. (Eastman).—Trombone.
CAMILLE CHURCHFIELD, B.A. (Redlands).—Flute.
ROGER COLE, B. Mus. (Juilliard).—Oboe.
GREGORY COX, B.Mus. (Eastman).—Trombone.
BRUCE DUNN.—Conducting, French Horn.
MARGOT EHLING, A.R.C.T., Artist Diploma (Toronto).—Piano.
ALICE ENNS, A.R.C.T., B.Mus. (Manitoba), B.A. (Saskatchewan).—Piano.
RICHARD EPP, B.Mus. (Manitoba), M.Mus. (Southern California).—Opera, voice accompanist.
JAMES I. EWEN, B.Mus. (Brit. Col.), M.Mus. (Cincinnati).—Bassoon.
J. WESLEY FOSTER.—Clarinet.
LORI FREEDMAN, B.Mus. (Toronto), O.T.P. (Toronto Conservatory of Music), Diploma (Sweelinck Conservatory, Amsterdam).—Clarinet.
KENNETH J. FRIEDMAN, B.Mus. (Southern California), M.S. (Juilliard).—Double Bass.
JOHN GAUDETTE, Diploma (Curtis Institute of Music).—Bassoon.
BRIAN F. G'FROERER, B.Mus. (Brit. Col.).—French Horn.
PETER HANNAN, B.Mus. (Brit. Col.).—Recorder.
ROBERT C. JORDAN.—Guitar.
R. SHARMAN KING, B.Mus. (Brit. Col.).—Trombone and Low Brass.
JAMES LITTLEFORD, B.Mus. (Brit. Col.).—Class Brass.
DAVID McCOY, B.Mus., M.Mus. (Brit. Col.).—Piano.
JANE KAY MARTIN, B.Mus. (Cleveland Institute of Music), M.M. (Oregon).—Flute.
CHRISTOPHER J. MILLARD.—Bassoon.
KENNETH W. MOORE.—Percussion.
DARRYL NIXON, Diploma (Geneva Conservatory).—Organ.
JULIA NOLAN, B.Mus. (Brit. Col.), M.Mus. (Indiana).—Saxophone.
RAY NURSE.—Lute.
DOREEN A. OKE, B.Mus. (Brit. Col.).—Harpsichord.
DAVID OWEN, B.Mus. (Saskatchewan), M.Mus. (New England Conservatory).—Oboe.
THOMAS PARRIOTT, B.Mus.Ed. (Houston), M.Mus. (Texas, Austin).—Trumpet.
GENE RAMSBOTTOM.—Clarinet.
ALAN RINEHART, Associate in Arts (Southwestern Michigan College).—Guitar.
JOHN RUDOLPH, M.Mus. (Catholic University of America).—Percussion.
MORNA RUSSELL, B.Mus. (Brit. Col.).—Collegium Musicum.
DOUGLAS SPARKES, B.Mus. (Toronto).—Trombone.
FREDERICK STRIDE, B.Mus. (Brit. Col.).—Stage Band, Jazz.
MICHAEL STRUTT.—Guitar.
MARY J. TICKNER, B.Mu.Ed. (Evansville), M.Mus. (Southern California).—Piano.
ELIZABETH VOLPÉ, B.Mus. (Toronto).—Harp.
MICHAEL WALL, B. Mus. (Houston).—French Horn.
ELLIS WEAN.—Tuba.

THE SCHOOL OF MUSIC

The School of Music offers programs of study in performance and composition, leading to the B.Mus., the M.Mus., and the D.M.A., as well as programs in musical scholarship, leading to the B.Mus., the M.A., and the Ph.D. The School also offers B.Mus. programs designed for prospective school teachers, elementary and secondary. All B.Mus. programs have a performance component. For students with a strong interest in music but little background in performance, the School offers the B.A. with a Major or Honours in Music. A description of the various Majors within the B.Mus. follows. For a description of the B.A. degree, see listing in the Faculty of Arts section of the Calendar. For graduate degrees, see listing under the Faculty of Graduate Studies.

The Bachelor of Music Degree

Admission Requirements

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 Undergraduate Admissions Officer, School 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 School will send forms which should be filled out and returned, one to the Registrar and another to the School's Undergraduate Admissions officer, with a copy of the applicant's (partial) transcript appended to each. Applicants for first year should also request that two letters of recommendation be sent to the Undergraduate Admissions Officer, The University of British Columbia, School of Music, 6361 Memorial Road, Vancouver, B.C., V6T 1W5. At least one of these should be from a 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 School 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 School's 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 School 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.

Performing Organizations

All students in the Bachelor of Music programs participate in the large and small instrumental and choral ensembles sponsored by the School of Music to develop their skill as musicians and to experience a wide range of repertoire. The ensembles are also open to qualified non-music majors, who may be accepted by audition and who may receive credit for participating (consult Faculty listings). The ensembles are the University Chamber Singers, University Singers, University Choral Union, University Symphony Orchestra, University Wind Ensembles, University Opera Workshop and Theatre, the Contemporary Players, the Asian Music Ensemble, the Stage Band, the Collegium Musicum Ensembles, and various chamber groups. 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 requirements, it refers to Music 150 (University Symphony Orchestra), 152 (University Wind Ensembles), 153 (University Singers), and 154 (University Choral Union).

Specific ensembles may tour extrasessionally. Student participation in such tours, while desirable, is not obligatory. Students should inform ensemble directors of their plans as early as possible in the Winter Session.

Recitals by Faculty and Students

Faculty Recitals: Members of the Faculty present formal recitals throughout the academic year. All students in the B.Mus. program are expected to attend.

Wednesday Noon-Hour Recitals: On many Wednesdays, recitals feature outstanding soloists and chamber ensembles. Students in the B.Mus. 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 B.Mus. 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 B.Mus. program are expected to attend.

Minimum Achievements in Piano

Where piano is neither the *Major* nor the *concentration* instrument, the student will be expected to demonstrate, normally by taking piano as a *secondary* instrument, 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).

Annual Review in the Performance and Composition Majors

All students enrolled in the performance and composition Major programs will be reviewed annually to determine whether they should be allowed to continue in their course of study.

Non-Music Electives

The non-Music elective requirements in each Major within the B.Mus. degree must be satisfied by taking courses available for credit in the Bachelor of Arts degree, that is, all courses in the Faculties of Arts (other than Music courses) and Science and those listed under **Courses in Other Faculties or Degree Programs** in the Faculty of Arts section of the Calendar.

English Composition Test Requirement

All B.Mus. students must pass English 100 and the English Composition Test by the time they have completed the number of units corresponding to three full years in their Major. Prospective fourth-year students who have not met these requirements will not be permitted to register for additional units.

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 just prior to the beginning of classes. Transfer students from other colleges and universities will audition at the same time. The auditions will determine the admission of students to the performance program and whether they will be allowed to transfer piano credits from other universities and colleges.

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 études (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 études (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. 1).

End of Third Year. Virtuoso études (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 études (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			Second Year	
(100)	Theory of Music I	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(136)	Piano Repertoire I	2	(236)	Piano Repertoire II	2
(193)	Music Performance (Piano)	3	(293)	Music Performance (Piano)	3
	[1]Large Ensemble	1		[1]Large Ensemble	1
(100)	English	3		Literature Requirement (Arts)	3
	Non-Music Elective(s)	3		Non-Music Elective(s)	3
		18			18

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(440)	Piano Teaching Methods and Materials	1
(301)	Theory of Music VI	1½	(495)	Music Performance (Piano Recital)	5
(395)	Music Performance (Piano Recital)	5	(349)	[2]Keyboard Accompanying II	1
(149)	Keyboard Harmony and Transposition	1	(161)	Piano Chamber Ensembles	1
(249)	[2]Keyboard Accompanying I	1		Non-Music Elective(s)	6
(161)	Piano Chamber Ensembles	1			
	Music Elective	3			
	Non-Music Elective(s)	3			
		17			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 School.
[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 program.

All students planning to major in organ in the Bachelor of Music program must audition for the Division of Keyboard Instruments just prior to the beginning of classes. 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. The auditions will determine the admission of students to the performance program and whether they will be allowed to transfer organ credits from other colleges and universities.

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: Chorales; 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.

First Year			Second Year		
(100)	Theory of Music I	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(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		Literature Requirement (Arts)	3
	Non-Music Elective(s)	3		Non-Music Elective(s)	3
		17			18

Third Year			Fourth Year		
(300)	Theory of Music V	1½		[3]Theory Electives	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		Non-Music Elective(s)	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 School.
[2]*Religious Studies.* To be elected after consultation with the Department of Religious Studies and School of 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 School of Music and the college concerned.
[3]Students will choose two courses from Music 410-415.

Major in Guitar

All students planning to major in guitar in the Bachelor of Music program are required to audition just prior to the beginning of classes. Transfer students from other colleges and universities will audition at the same time. The auditions will determine the admission of students to the performance program and whether they will be allowed to transfer credits in guitar performance from other universities and colleges.

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. The possession of a diploma is not a guarantee of acceptance.

Students accepted as first-year guitar majors will be expected to attain annual levels corresponding approximately to those given below. The works cited are given as guides to the levels of technical and musical achievement to be attained and do not indicate specific repertoire requirements.

Entrance auditions and term examinations will include sight reading and quick study in addition to the performance of prepared repertoire. Third-year students will be required to study French and Italian lute tablature systems (in their private lessons). Fourth-year students will be expected to transcribe a work from the repertoire of another instrument (e.g. piano, violin).

End of First Year. Etudes (Villa-Lobos: No. 1, Mignone: No. 10); Dowland: *Lacrimae Pavan;* Weiss: Fantasia; Sor: Fantasia Op. 7; Berkeley: Theme and Variations.

End of Second Year. Etudes (Villa-Lobos: No. 6, Sor: [Segovia] No. 12); Dowland: Fantasia; Bach: Third Lute Suite; Somers: Sonata; Torroba: *Suite Castellana*.

End of Third Year. Etudes (Villa-Lobos: No. 2, Dodgson: [Quine] No. 20); Bach: Prelude, Fugue and Allegro; Sor: Sonata Op. 22; Walton: Bagatelles; Concertos (e.g., Castelnuovo-Tedesco); vocal and instrumental accompaniments; chamber works. Third-year recital.

End of Fourth Year. Etudes (Villa-Lobos: No. 10, Mignone: No. 3); Bach: Fourth Lute Suite; Castelnuovo-Tedesco: Sonata; Britten: *Nocturnal;* Bolcom: *Seasons*; Concerto (e.g. Rodrigo: *Aranjuez*); vocal and instrumental accompaniments; chamber works. Fourth-year recital.

First Year			Second Year		
(100)	Theory of Music I	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(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 (Guitar)	3	(293)	Music Performance (Guitar)	3
(171)	[1]Piano	1	(271)	[1]Piano	1
	[2]Large Ensemble	1		[2]Large Ensemble	1
(160)	[3]Chamber Ensemble	1	(160)	[3]Chamber Ensemble	1
(100)	English	3		Literature Requirement (Arts)	3
	Non-Music Elective(s)	3		Non-Music Elective(s)	3
		18			18

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(495)	Music Performance (Guitar Recital)	5
(301)	Theory of Music VI	1½		[4]Small Ensemble	1
(395)	Music Performance (Guitar Recital)	5		Music Electives	3
(309)	Instrumentation	1		Non-Music Elective(s)	6
(310)	Orchestration	1			
	[4]Small Ensemble	1			
	Music Electives	3			
	Non-Music Elective(s)	3			
		17			15

[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:* Students may elect any one of Music 150, 152, 153, or 154, with the permission of the School.
[3]*Chamber Ensemble:* Students will take the Guitar Ensemble section of 160.
[4]*Small Ensemble:* Students will be placed in one of the Small Ensembles (Collegium Musicum, Asian Music Ensemble, Contemporary Players, or String Chamber Ensembles).

Major in Voice

Students planning to major in Voice must successfully audition before the Vocal division just prior to the beginning of classes, singing music of their own choice.

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	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(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
(170)	Lyric Diction	1		Literature Requirement (Arts)	3
(100)	English	3		[3]German	3
	[3]French	3			
		17			17

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(494)	Music Performance (Voice Recital)	4
(301)	Theory of Music VI	1½	(465)	Song Repertoire II	1
(394)	Music Performance (Voice Recital)	4	(442)	Song Interpretation & Accompaniment	2
(306)	Conducting	2		Large Ensemble	1
(365)	Song Repertoire I	1		[4]Chamber Ensemble	1
	Large Ensemble	1		[5]Music Elective	3
	[3]Italian	3		Non-Music Elective(s)	3
	Non-Music Elective(s)	3			
		17			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 157 (Vocal Collegium Musicum Ensemble).
[5]Music 441 (Vocal Techniques) (1) is a recommended elective.

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.

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 become 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 and production of scenes or complete operas continue.

First Year			Second Year		
(100)	Theory of Music I	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(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		Literature Requirement (Arts)	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	2		[3]Non-Music Elective(s)	3
(170)	Lyric Diction	1			
	[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]*Non-Music Elective(s):* To 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 School. 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.

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 School of Music.

First Year			Second Year		
(100)	Theory of Music I	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(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		Literature Requirement (Arts)	3
		16			16

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(494)	Music Performance (Recital)	4
(301)	Theory of Music VI	1½		[2]Large Ensemble	1
(394)	Music Performance (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		Non-Music Elective(s)	6
	[4]Specialized Ensemble	1			
	Non-Music Elective(s)	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 (Instrumentation) and 310 (Orchestration) are highly recommended as especially appropriate to this Major. Additional units of ensemble are not permitted for fulfilling the Music Elective requirement except Music 156 and 157 (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, including performance, and to prepare students for professional work in a wide variety of fields such as criticism, broadcasting, editing, and arts management. The degree will allow continuation toward graduate degrees.

All applicants for the Major in General Studies will be required to audition on the instrument of their greatest competence. Students are required to study for four years in a concentration of their own choice; possibilities are 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.

Students interested in preparing to teach music in B.C. schools should see Major in General Studies: Secondary Education Stream, or Major in General Studies: Elementary Education Stream.

First Year			Second Year		
(100)	Theory of Music I	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(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 (Concentration)	2	(282)	[1]Music Performance (Concentration)	2
(171)	[2]Music Performance (Secondary)	1	(271)	[2]Music Performance (Secondary)	1
	[3]Large Ensemble	1		[3]Large Ensemble	1
(100)	English	3		Literature Requirement (Arts)	3
	[4]Non-Music Elective(s)	3		[4]Non-Music Elective(s)	3
		16			16

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(482)	[1]Music Performance (Concentration)	2
(301)	Theory of Music VI	1½		[3]Large Ensemble	1
(382)	[1]Music Performance (Concentration)	2		[3],[5]Small Ensemble	1
	[3]Large Ensemble	1		[6]Music Electives	6
	[3]Small Ensemble	1		[4]Non-Music Elective(s)	6
	[6]Music Electives	6			
	[4]Non-Music Elective(s)	3			
		16			16

[1]The concentration instrument is usually the one on which the student is most competent, and on which the student auditioned to enter the School.

[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: technique, repertoire, keyboard harmony, score reading, sight reading, and transposition. (For details, consult the faculty coordinator, keyboard performance division.)

[3]The large and small ensembles chosen are normally those most appropriate to the student's concentration instrument. Substitutions can occasionally be made after consultations with the student's adviser, and with some consideration being given to the needs of the ensembles. **Students with 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 non-Music electives may be freely chosen, 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 literature requirement.

[5]May be waived if inappropriate to the concentration instrument or to the needs of the student, or if instruction is unavailable. If waived on request of the student, or by decision of the Director, School of Music, the Music Electives will be increased from six to seven units.

[6]Students may choose a maximum of three units of additional large or small ensemble work as part of the Music Elective requirements, provided authorization is given by the Director, School 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 with keyboard concentrations must take Music 149. Those with 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 Director, School of Music, students may take a maximum of one unit of Music Performance (Secondary) in each of the third and fourth years, in partial fulfillment of the Music Elective requirements in those years.

Major in General Studies: Secondary Education Stream

This curriculum is a preparation for studies in education leading to certification as a music teacher in B.C. secondary schools. Successful completion of the program, or a program with comparable requirements, is a prerequisite for admission into the B.Ed. (Secondary) program of the Faculty of Education, with music as the major teaching field.

The curriculum is based on that of the Major in General Studies (see above), with the following differences:

All Years. (1) *Large Ensemble*: for instrumental concentrators, one of these, in the four years, must be a choir, and the remaining three will be orchestra or wind symphony, as appropriate.

(2) *Non-Music Electives*: students should consult the Faculty of Education for distribution requirements.

Second Year. Students must also take Music 122 (Class Woodwinds), one unit, and Music Education 106, one unit, for a total of eighteen units for the year.

Third Year			Fourth Year		
(300)	Theory of Music V	1½	(482)	Music Performance (Concentration)	2
(301)	Theory of Music VI	1½		[2]Music Performance (Secondary)	1
(306)	Conducting	2		Large Ensemble	1
(112)	Class Brasses & Percussion	1		[3]Music Electives	1 or 1½
(382)	Music Performance (Concentration)	2		Non-Music Elective(s) (see above)	6
(371)	Music Performance (Secondary)	1	(309)	Instrumentation	1
	Large Ensemble	1	(401)	Music Education	1
	Small Ensemble	1	(302)	Music Education	2
	[1]Music Electives	3	(303)	Music Education	2
	Non-Music Elective(s) (see above)	3			
		17			17 or 17½

[1]One unit of the Music Elective may be in additional small ensemble work.

[2]Voice concentrators take an appropriate level of their secondary instrument; those with previous secondary voice instruction, take an appropriate level of voice or of the secondary instrument begun in the third year; those without previous voice instruction, take Music 131 (Class Voice).

[3]Students with some background in strings are strongly encouraged to take Music 102 (Class Strings). Otherwise, any course of the correct unit value, apart from private performance instruction, may be selected.

Students doing the B.Ed. (Secondary) degree will be required to take an additional 1½ units of Music elective as part of that program. This will be a music history, music theory, or composition course.

Major in General Studies: Elementary Education Stream

This curriculum is a preparation for studies in education leading to certification as a teacher in B.C. elementary schools. It is intended for those who expect to become elementary music **specialists** as opposed to general classroom teachers. Students interested primarily in general classroom teaching should consider the B.A. with a Major in Music. The following program, leading to a B.Mus., is for those who expect to be full-time music teachers in the elementary schools. Students who successfully complete this program will have the prerequisites for admission to the professsional program in elementary education in the Faculty of Education.

The curriculum is based on that of the **Major in General Studies**, with the following differences:

All Years. Large Ensemble: for instrumental concentrators, one of these, in the four years, must be a choir, and the remaining three will be orchestra or wind symphony, as appropriate.

Students should consult the Faculty of Education requirements for admission to the Teacher Education Program.

Second Year. Students must also take Music Education 106, one unit, for a total of seventeen units.

Third Year			Fourth Year		
(300)	Theory of Music V	1½		[2]Music Elective(s)	3
(301)	Theory of Music VI	1½	(482)	Music Performance	2
	[1]Music Electives	5-6		Large Ensemble	1
(382)	Music Performance	2		[3]Music 131	1
	Large Ensemble	1		Instrumental Class (Music 102, 112, or 122)	1
	Instrumental Class (Music 102, 112, or 122)	1		Non-Music Elective(s)	6
	Non-Music Elective(s)	3		Music Education Electives	2
	Music Education Electives	2			
		17-18			16

Notes

[1]The third-year music electives may include Music 306 (Conducting). Any appropriate history, theory, or composition course may be elected. A maximum of 1 unit of small ensemble and 1 unit of secondary performance may be elected.

[2]The music elective(s) in fourth year must be in history, theory, or composition.

[3]Students are required to take Music 131 (Class Voice) if they have had no previous vocal instruction. Vocal concentrators will take an appropriate level of some secondary instrument. Vocal secondaries will take the appropriate level of voice secondary.

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	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(172)	[1,9]Music Performance, or		(272)	[9]Music Performance, or	
(182)	[1,9]Music Performance	2	(282)	[9]Music Performance	2
	[2]Large Ensemble	1		Large Ensemble	1
(100)	English	3		Literature Requirement (Arts)	3
	[3]French or German	3		French or German	3
		15			15
Third Year			**Fourth Year**		
(300)	Theory of Music V	1½		[7]Theory Electives	3
(301)	Theory of Music VI	1½	(472)	[9]Music Performance, or	
(372)	[9]Music Performance, or		(482)	[9]Music Performance	2
(382)	[9]Music Performance	2		Chamber Ensemble	1
	[4]Chamber Ensemble	1		[5]Music History Electives	6
	[5]Music History Electives	6		[8]Non-Music Elective(s)	6
	[6]History	3			
		15			18

[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.) 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 secondary school, it is recommended that the other be taken at the University.

[4]*Chamber Ensemble:* To be elected depending upon the student's performing field.

[5]*Music History Electives:* To be chosen from Music 350, 352-357.

[6]*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 School of Music.

[7]*Theory Electives:* Students will choose two courses from Music 410-415; in exceptional circumstances Music 402, *Special Projects,* may be substituted for one or both of these.

[8]A course in the history of fine arts is strongly recommended.

[9]If Music 182, 282, 382, or 482 are chosen, the student is expected to meet jury requirements.

Major in Composition

This four-year program is formulated for the student with particular capabilities in musical composition.

A student will not be allowed to enrol in this program 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 School of Music.

Two copies of each approved work must be presented to the School 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	1	(200)	Theory of Music III	1
(101)	Theory of Music II	1	(201)	Theory of Music IV	1
(105)	Aural Skills I	1	(205)	Aural Skills II	1
(120)	History of Music I	1½	(220)	History of Music III	1½
(121)	History of Music II	1½	(221)	History of Music IV	1½
(172)	[2,6]Music Performance, or		(272)	[2,6]Music Performance, or	
(182)	[2,6]Music Performance	2	(282)	[2,6]Music Performance	2
	[3]Ensemble	1	(309)	Orchestration	2
(100)	English	3		[3]Ensemble	1
	Non-Music Elective(s)	3		Literature Requirement (Arts)	3
		18			17
Third Year			**Fourth Year**		
(300)	Theory of Music V	1½		[5]Theory Electives	3
(301)	Theory of Music VI	1½	(407)	Composition IV (Recital)	3
(307)	Composition III	3	(472)	[2,6]Music Performance, or	
(372)	[2,6]Music Performance, or		(482)	[2,6]Music Performance	2
(382)	[2,6]Music Performance	2	(306)	Conducting	1
	[3]Ensemble	1		[3]Ensemble	1
	[4]Music Elective	3		Music Elective	3
	Non-Music Elective(s)	6		Non-Music Elective(s)	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]*Ensemble:* The ensemble requirement for the four years is defined as 1 unit of large ensemble, 1 unit of small ensemble, and 2 units of either.

[4]*Music Elective:* Music 328 (at least 1½ units) is recommended as the third-year music elective.

[5]Students will choose two courses from Music 410-415.

[6]If Music 182, 282, 382, or 482 are chosen, the student is expected to meet jury requirements.

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	1
(101)	Theory of Music II	1
(105)	Aural Skills I	1
(120)	History of Music I	1½
(121)	History of Music II	1½
(172)	[1,7]Music Performance, or	
(182)	[1,7]Music Performance	2
(141)	[2](Class Piano)	(1)
	Large Ensemble	1
(100)	English	3
	[3]Non-Music Elective(s)	3
		15 or 16

Second Year

(200)	Theory of Music III	1
(201)	Theory of Music IV	1
(205)	Aural Skills II	1
(220)	History of Music III	1½
(221)	History of Music IV	1½
(272)	[1,7]Music Performance, or	
(282)	[1,7]Music Performance	2
(241)	(Class Piano)	(1)
	Large Ensemble	1
	Literature Requirement (Arts)	3
	[3]Non-Music Elective(s)	3
		15 or 16

Third Year

(300)	Theory of Music V	1½
(301)	Theory of Music VI	1½
(107)	Composition I	3
(372)	[1,7]Music Performance, or	
(382)	[1,7]Music Performance	2
	Large or Small Ensemble	1
	[4]Keyboard Harmony	1
	[3]Non-Music Elective(s)	6
		16

Fourth Year

	[6]Theory Electives	3
(309)	Orchestration	2
(472)	[1,7]Music Performance, or	
(482)	[1,7]Music Performance	2
	Large or Small Ensemble	1
	[5]Music Elective(s)	3 or 1½
	[5]Theory Project	1½ or 3
	[3]Non-Music Elective(s)	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 non-Music electives, or 13½ units of non-Music 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 the literature requirement. 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 taking Music 149. Other students should take Music 343 or its equivalent as provided by the School.

[5]Fourth-year students have the option of choosing 3 units of music electives and doing a one-term (1½-unit) 402 project, or of choosing 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.

[6]Students will choose two courses from Music 410-415.

[7]If Music 182, 282, 382, or 482 are chosen, the student is expected to meet jury requirements.

The Bachelor of Arts Degree in Music

The B.A. in Music is designed for students interested in studying music as one of the liberal arts. It can also lead successfully to graduate work in music theory, music history, or ethnomusicology. For a description of the B.A. Major and Honours programs in Music, see the Faculty of Arts section of the *Calendar*.

Courses for Students Majoring in Other Fields

The School offers a number of courses intended for students with little or no formal background in music. A selection from among these is offered each year. Included are:

courses not creditable toward the B.Mus. or the B.A. in Music
- Music 106 (1½/3) Introduction to Music Composition
- Music 225 (1½) Masterworks of Western Music
- Music 321 (1½/3) Music Appreciation, Twentieth Century
- Music 324 (1½) Music and Civilization I
- Music 325 (1½) Music and Civilization II
- Music 326 (1½/3) Music Appreciation

course creditable toward the B.A. in Music but **not** the B.Mus.
- Music 103 (1½) Introduction to the Theory of Music

courses creditable to both the B.Mus. and the B.A. in Music
- Music 328 (1½) World Music Cultures
- Music 345 (1½) Aesthetics and Practice of Film Music

THE SCHOOL OF NURSING

(A School within the Faculty of Applied Science)

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M. JUDITH LYNAM, B.Sc.(N) (McGill), M.S.N. (Brit. Col.), R.N., Assistant Professor.
BARBARA MILNE, B.Sc.N., M.Sc.N. (Toronto), R.N., 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.
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.
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.
SHELAGH J. SMITH, B.A.Sc., M.S.N. (Brit. Col.), R.N., Senior Instructor.
LOUISE TENN, B.Sc.N. (Ottawa), M.Ed. (Montreal), R.N., Senior Instructor.
CARMEL CHAMBERS, B.S.N., M.A. (Brit. Col.), R.N., Lecturer.
FLORENCE MANN, B.S.N. (Sask.), R.N., Lecturer.
PATRICIA RODNEY, B.Sc.N. (Alberta), M.S.N. (Brit. Col.), R.N., Lecturer.

Adjunct Professors

MATILDA BARA, B.N. (Dalhousie), M.S.N., M.Ed. (Brit. Col.), R.N., Director, Staff Development, Nursing, Vancouver General Hospital.
CHRISTINE F. BRADLEY, B.A., M.S. (McGill), Ph.D. (Brit. Col.), Director of Research and Evaluation in Nursing, Vancouver General Hospital.
HEATHER F. CLARKE, B.H.Sc. (Queen's), M.N., Ph.D. (Washington), R.N., Nursing Research Consultant, Registered Nurses' Association of British Columbia.
MICHÈLE DESCHAMPS, B.Sc.N. (Montreal), M.Sc.(A) (McGill), Ph.D. (Montreal), R.N., Research Consultant, Cancer Control Agency of B.C.
IRENE L. GOLDSTONE, B.N. (McGill), M.Sc. (Brit. Col.), R.N., Director, Medical Nursing, St. Paul's Hospital.
ALICE JOPE, B.S.N. (Lakehead), M.Ed., Ph.D. (Manitoba), R.N. Chief Nursing Officer and Assistant Administrator, University Hospital, Shaughnessy Site.
JUDITH MacDONALD, B.N. (McGill), M.S.N. (Brit. Col.), R.N., Director, Patient and Nursing Education Services, Children's Hospital.
T. ROSE MURAKAMI, B.S.N. (Brit. Col.), M.Sc.(A) (McGill), M.S. (Rehab. Nsg.) (Boston), R.N., Chief Nursing Officer and Assistant Administrator, University Hospital, UBC Site.
CHERYL A. PLUMMER, B.Sc.N. (Ottawa), M.Ed. (Calgary), R.N., Senior Adviser, Nursing Informatics, Children's Hospital.
INGE SCHAMBORZKI, B.N., M.Sc.(A) D.Ed. (McGill), R.N., Vice-President Nursing, Vancouver General Hospital.

Clinical Associates

MARILYN J. CRAWFORD, B.N., M.N. (Calgary), R.N., Clinical Assistant Professor.
KAREN A. JANES, B.S.N., M.S.N. (Brit. Col.), R.N., Clinical Instructor.
CHRISTINE SALTON, B.A., M.S.N. (Brit. Col.), R.N., Clinical Instructor.
ROSALIE STARZOMSKI, B.N. (Dalhousie), M.N. (Calgary), R.N., Clinical Assistant Professor.
RENA VAN DER WAL, B.S.N. (Brit. Col.), M.N. (Alberta), R.N., Clinical Instructor.
BARBARA WARREN, B.N. (Manitoba), M.S.N. (Brit. Col.), R.N., Clinical Assistant Professor.

Clinical Staff in Associated Agencies:

Burnaby Health Department.
Burnaby Hospital.
Cancer Control Agency of B.C.
Children's Hospital.
Fairmont Family Practice Unit.
Grace Hospital.
Holy Family Hospital.
Lions Gate Hospital.
Louis Brier Hospital.
Mount St. Joseph Hospital.
Peace Arch District Hospital.
Pearson Hospital.
Provincial Health Department — Central Fraser Valley Health Unit, and Simon Fraser Health Unit.
Richmond Health Department.
St. Paul's Hospital.
G. F. Strong Rehabilitation Centre.
University Hospital, Shaughnessy Site.
University Hospital, UBC Site.
Vancouver City Health Department.
Vancouver General Hospital.

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.).
This program is a joint offering of the School of Nursing and Vancouver General Hospital.

(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. This program is a joint offering of the School of Nursing and Vancouver General Hospital.

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.

Objectives of the Baccalaureate Program

Students who complete the baccalaureate program and earn the B.S.N. degree are prepared to provide nursing care to clients (individuals of all ages, families and other groups) in primary care settings as well as acute and long-term settings. In these settings, graduates are expected to:

1. use the nursing process within a conceptual framework for nursing.
2. relate therapeutically with clients.
3. perform nursing techniques with the degree of skill that ensures the client's comfort and safety.
4. apply principles of learning and teaching in the provision of nursing care.
5. use research findings in the provision of nursing care.
6. demonstrate clinical judgment in nursing practice.
7. be responsible and accountable in the professional practice of nursing.
8. apply management principles in nursing practice.
9. demonstrate the ability to assume a leadership role with clients and colleagues.
10. work collaboratively with members of the health care team in the provision of health care.
11. respond appropriately to changes in the health care field.
12. be committed to enhancing the stature of the nursing profession.

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 $100.00 (by cheque payable to the University of British Columbia). This deposit will be applied toward tuition fees. If the applicant does not register the deposit will be forfeited.

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. Applicants who have completed college and/or university courses and are deficient in Physics 11 or Chemistry 12 should consult an adviser in the School of Nursing.

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. Normally, admission to the School of Nursing requires a minimum academic standing of C+ average (2.5 on a 4-point scale) based on either Senior Secondary School graduation or at least six (6) units of university transfer course work, whichever is most recent.

Applicants applying as registered nurses must have current practising British Columbia registration 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) Two (2) satisfactory references from employers for whom they have worked within the three years preceding application for admission.

(ii) Satisfactory completion of an R.N.A.B.C.-approved refresher course within three years prior to admission. Satisfactory references are required from:
a refresher course instructor;
a supervisory person in a nursing unit in which the applicant has had clinical experience during or subsequent to the refresher course.

(iii) Graduation from an approved School of Nursing within the last three years; work experience is not required.

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. 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 six (6) years of initial enrolment in one or more nursing courses except NURS 426.

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 or graduate from 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.

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.

A student assigned FAIL standing will normally be required to discontinue study at the University for at least one year.

Students admitted as registered nurses must maintain current practising British Columbia registration and provide evidence of it upon request in order to continue in the program.

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).

Students (including transfer students) who have obtained credit for English 100 but who have not passed the Composition Test will write it at the first available sitting in September. The Test will also be given during the December examination period, in late March 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.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

1) Transfer students who enter UBC in 1990 may sit the September 1990 Test without charge.
2) Students enrolled in English 100 may sit their mid-course ECT without charge;

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 examination 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

The program described below is the one to be followed by students enrolling in September, 1987 and thereafter.

Students will be required to show proof of annual completion of the St. John Ambulance Association basic life support course, "Basic Rescuer" — Level C, or the equivalent thereof at the beginning of each academic year.

First Year

Nursing 105 Professional Nursing in Contemporary Society I	1 unit
Nursing 130 Introduction to Nursing Care I	1½ units
Nursing 131 Introduction to Nursing Care II	2 units
Biology 153 Human Biology	3 units
Psychology 100 Introductory Psychology	3 units
English 100 Literature and Composition	3 units
Microbiology 153 Applied Microbiology	1½ units

Second Year

Nursing 202 Core Concepts in Nursing	2 units
Nursing 230 Nursing Care of Adults	3 units
Nursing 231 Nursing Care of Older Adults	3 units
Pharmacy 240 Pharmacology for Nurses	1½ units
Pathology 375 Introduction to Human Pathology	1 unit
*Elective(s): Social or Behavioural Science	3 units
FNSC 209 Nutrition	1½ units

Note: Students are required to complete the St. John Ambulance Association basic life support course, "Basic Rescuer" — Level C, or the equivalent thereof before entering Second Year and to show proof of annual completion at the beginning of each academic year.

Third Year

**Nursing 302 The Process of Nursing I	3 units
**Nursing 335 The Process of Nursing II	3 units
***Nursing 333 Nursing Care of Children	3 units
***Nursing 334 Nursing Care of Individuals in the Childbearing Cycle	3 units
Nursing 303 Family and Community Nursing	2 units
Nursing 304 Introduction to Nursing Research	1½ units
Nursing 305 Professional Nursing in Contemporary Society II	1 unit
Statistics 203 Statistical Methods I	1½ units
Elective(s): 300/400 level	3 units

Third year courses for registered nurses are as follows:

Nursing 302 The Process of Nursing I	3 units
Nursing 303 Family and Community Nursing	2 units
Nursing 304 Introduction to Nursing Research	1½ units
Nursing 305 Professional Nursing in Contemporary Society II	1 unit
Nursing 335 The Process of Nursing II	3 units
Statistics 203 Statistical Methods I	1½ units
Elective(s): 300/400 level	3 units

Note: Registered nurse students are expected to complete the St. John Ambulance Association basic life support course, "Basic Rescuer" — Level C, or the equivalent thereof before entering Third Year.

Fourth Year
(Effective September, 1990)

Nursing 405 Issues in Professional Nursing	1 unit
Nursing 406 Management in Nursing Practice	1½ units
Nursing 426 Nursing and the Health of Communities	1½ units
***Nursing 432 Nursing Care of Adults and Families with Mental Health Concerns I	3 units
Nursing 440-444 (generic students select one; R.N. students select two.)	3-6 units
Electives: 300/400 level	6 units
(Nursing 408 or 409 may be selected for 3 units of elective credit)	
Nursing 445 Extended Practicum in Professional Nursing	0 units

*Electives may be selected from any of the courses offered 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 by arranging an appointment with the year coordinator or designated academic adviser.

**Registered Nurse students only
***Generic students only

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 developinent 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

This program is currently under review. Prospective students should contact the School of Nursing Graduate Adviser for information on proposed changes.

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: Division of Research Awards, Canadian Heart Foundation, Suite 1200, 1 Nicholas Street, Ottawa, Ontario, K1N 7B7.

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 to $6,000 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.

THE FACULTY OF PHARMACEUTICAL SCIENCES

ACADEMIC STAFF

Office of the Dean

JOHN H. McNEILL, B.Sc. (Pharm.), M.Sc. (Alta.), Ph.D. (Mich.), Dean of the Faculty and Professor of Pharmacology and Toxicology.
JOHN G. SINCLAIR, B.S.P. (Sask.), Ph.D. (Purdue), Assistant Dean of Graduate Studies and Research, and Professor of Pharmacology and Toxicology.
JAMES M. ORR, B.Sc. (Pharm.), M.Sc. (Alta.), Ph.D. (Calif.), Associate Dean of Undergraduate Programs, and Associate Professor of Pharmaceutics and Biopharmaceutics.

Continuing Pharmacy Education

SHARON McKINNON, B.Sc. (Pharm.) (Brit. Col.), Director.
DAVID W. FIELDING, B.Sc. (Pharm.), M.Sc. (Dalhousie), Ed.D. (Brit. Col.), Associate Director, Research and Evaluation.

Division of Pharmaceutical Chemistry

FRANK S. ABBOTT, B.S.P., M.S. (Sask.), Ph.D. (Purdue), Professor and Chairman.
DONALD M. LYSTER, B.Sc. (Pharm.), M.Sc., Ph.D. (Alta.), Professor.
KEITH M. J. McERLANE, B.Sc. (Pharm.), Ph.D. (Alta.), Associate Professor.
STELVIO BANDIERA, B.Sc. (Waterloo), M.Sc. (Dalhousie), Ph.D. (Guelph), Assistant Professor.
SIMON P. ALBON, B.Sc., M.Sc. (Brit. Col.), Instructor.
MICHAEL J. ADAM, B.Sc., Ph.D. (Brit. Col.), Adjunct Professor.
RONALD HARROP, B.A., M.A., Ph.D. (Cantab.), Adjunct Professor.
LAWRENCE D. MAYER, B.Sc. (Wartburg, Minn.), Ph.D. (Bioc.) (Minn.), Adjunct Professor.
JOEL C. ROGERS, B.S. (M.I.T.), M.S., Ph.D. (Calif. L.A.), Adjunct Associate Professor.

Division of Pharmaceutics & Biopharmaceutics

HELEN M. BURT, B.Pharm. (Bath), Ph.D. (Brit. Col.), Associate Professor and Chairman.
JAMES E. AXELSON, B.S. (Wash.), Ph.D. (State Univ. of N.Y. at Buffalo), Professor.
ALAN G. MITCHELL, B.Pharm., Ph.D. (London), M.P.S., Professor.
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TAMMY TORIGLIA, B.Sc. (Pharm.) (Brit. Col.).
KAREN YOUNIE, B.Sc. (Pharm.) (Brit. Col.).

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).

Students (including transfer students) who have obtained credit for English 100 but who have not passed the Composition Test will write it at the first available sitting in September. The test will also be given during the December Examination period, in late March and in July.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

(1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.
(2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

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 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 one hundred dollars ($100.00) (by cheque payable to the University of British Columbia), which deposit will later be applied to the tuition fees. The deposit is non-refundable if the student fails to attend the session.

NOTE:

The deposit of one hundred 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 sent a letter of acceptance and details of the registration procedures.

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 6 units or more 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 6 units or more 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, Suite 200, 1765 West 8th Avenue, Vancouver, B.C. V6J 1V8; Tel. (604) 733-2440.

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 from the Registrar, Pharmacy Examining Board of Canada, Suite 603, 123 Edward Street, Toronto, Ontario M5G 1E2; Tel. (416) 979-2431.

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. 351(1½), Introduction to Pharmacy Management	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. 456(1½), Pharmaceutical Law, Ethics and Pharmaceutical Organizations	3	0	or	3	0
*Pharm. 469 (0), Professional Practice Clerkship	—	—		—	—
†Electives (see below) minimum 8 units	—	—		—	—

*Compulsory. 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. Five elective units are to be chosen from offerings within the Faculty and 3 units chosen from outside the Faculty. All courses selected to meet these requirements must be approved by the Dean's Office.

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.

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:

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 Canadian Foundation for Pharmacy office by June 1st. Application forms are available in the office of the Dean or from the Canadian Foundation for Pharmacy 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 Canadian Foundation for Pharmacy office by June 1st. Application forms are available in the office of the Dean or from the Canadian Foundation for Pharmacy 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 Canadian Foundation for Pharmacy office by September 30th. Application forms are available in the office of the Dean or from the Canadian Foundation for Pharmacy office.

The Past Presidents' Award ($500 and a Certificate of Merit)

The Canadian Foundation for Pharmacy Annual Past Presidents' Awards Program is intended to recognize the most outstanding student in each of Canada's Faculties/Schools/Colleges of Pharmacy. Selection of winning candidates is made by the Dean or Director in each Faculty, College or 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 to the community in his/her profession. Winners' names should be submitted to the Foundation office by June 1st.

THE SCHOOL OF PHYSICAL EDUCATION AND RECREATION

(A School in the Faculty of Education)

ACADEMIC STAFF

ROBERT W. SCHUTZ, B.P.E. (Brit. Col.), M.Sc. (Alberta), Ph.D. (Wisconsin), Professor (and Acting Director).
ERIC F. BROOM, Dip. in Phys. Ed. (Loughborough Coll.), M.S. (Washington), Ph.D. (Illinois), Professor.
ROBERT G. HINDMARCH, B.P.E. (Brit. Col.), M.S., Ed.D. (Oregon), Professor.
W. ROBERT MORFORD, B.P.E., M.P.E. (Brit. Col.), Ed.D. (Berkeley), Professor.
PATRICIA VERTINSKY, B.A. (Birmingham), M.Sc. (Calif. L.A.), Ed.D. (Brit. Col.), Professor.
ANGELO BELCASTRO, B.A., B.Sc. (McMaster), M.Sc. (Dalhousie), Ph.D. (Alberta), Associate Professor.
F. ALEX CARRE, B.P.E., M.A. (P.E.) (Alberta), Ph.D. (Oregon), Associate Professor.
DOUGLAS B. CLEMENT, B.Sc. (Oregon), M.D. (Brit. Col.), Associate Professor.
KENNETH D. COUTTS, B.A. (Oberlin College), M.A., Ph.D. (Michigan State), Associate Professor.
IAN MICHAEL FRANKS, B.Ed. (McGill), M.Sc., Ph.D. (Alberta), Associate Professor.
DONALD C. McKENZIE, B.Sc. (Guelph), M.P.E., M.D. (Brit. Col.), Ph.D. (Ohio), 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.
EDWARD C. RHODES, B.Ed. (Alberta), 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.
BONNIE GORDON, B.A. (P.E.) (Sask.), M.Sc. (Purdue), Assistant Professor.
NESTOR N. KORCHINSKY, B.P.E., M.A. (Alberta), Ph.D. (Oregon), Assistant Professor.
MOIRA LUKE, Dip. Phys. Ed. (London), M.Ed. (Western Washington), Ph.D. (Washington), Assistant Professor.
DAVID J. SANDERSON, B.Sc., M.Sc. (Simon Fraser), Ph.D. (Pennsylvania State), Assistant Professor.
ROBERT E. C. SPARKS, B.A. (Wesleyan), M.S. (Massachusetts), Ph.D. (Massachusetts), Assistant Professor.
SHARON A. WHITTAKER-BLEULER, B.Sc., M.P.E. (Brit. Col.), M.S. (Washington), Ph.D. (Washington), Assistant Professor.
C. INGE WILLIAMS, B.P.E., M.P.E. (Brit. Col.), Ed.D. (Oregon), Assistant Professor.
ANNE ANTHONY, M.Ed. (Western Washington), Ph.D (Alberta), Senior Instructor.
ALENA BRANDA, B.P.E., M.P.E. (Charles U., Prague), Senior Instructor.
JOHN GLENN KELSO, B.A. (Denver), M.Sc. (Oregon), Senior Instructor.
BARRY LEGH, B.Ed. (Brit. Col.), M.P.E. (Washington), 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.
JEAN CUNNINGHAM, M.A. (Ed.) (Simon Fraser), Lecturer.
SUSAN CRAWFORD, B.H.E. (Brit. Col.), M.Sc. (London), Lecturer.

THE SCHOOL OF PHYSICAL EDUCATION AND RECREATION

Degree programs offered in the School of Physical Education and Recreation are the Master of Physical Education and the Bachelor of Physical Education.

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

Due to limited resources, the School has been authorized to restrict enrolment. Achievement of the minimum requirements for admission does not guarantee acceptance. See General Information section on Admission.

Application Deadline

Students applying to enter the School must make formal application to the Registrar of the University no later than May 31 with a documentation deadline of June 30.

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.

Students in all years are normally subject to General Academic Regulations. Supplemental examinations will not be granted in Physical Education courses where the final examination contributes less than 40% of the course grade. 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 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 (including transfer students) who have obtained credit for English 100 but who have not passed the ECT will write it at the first available sitting in September. The Test will also be given during the December examination period, in late March and in July.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.
2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

Students who anticipate difficulty passing the Test are advised to enrol in a remedial English course in the Centre for Continuing Education.

Unsatisfactory Standing

Fail standing in a session will be assigned if a student does not meet one of the following conditions:

a) passes in all units attempted;
OR
b) if taking more than 6 units, passes in at least three-fifths of them **AND** obtains an overall average of at least 60% in three-fifths of the units taken;
OR
c) if taking 6 or fewer units, passes in at least one-half of them.

At any level of study, a student 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 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.

THE BACHELOR OF PHYSICAL EDUCATION DEGREE
(66 units)

The Bachelor of Physical Education Degree (BPE) prepares students for academic specializations and career opportunities in sport science, leisure studies, health and physical education.

B.P.E. Course of Studies

DEGREE REQUIREMENTS

ENGL 100; AND 3 units of English courses at the 200-level or higher (see Note 1)	6 units
Physical Education Core	16½ units
Program Courses (see: Course of Studies)	40½ units
PHED Electives	3 units
	66 units

NOTES:

1. **Physical Education Core (16½ units)**
The following courses are required:
PHED 103 (1½). — Conditioning for Sport and Physical Activity
PHED 110 (1½). — Analysis of Individual Sport and Dance Performance
PHED 161 (1½). — Introduction to Social Aspects of Leisure and Sport
PHED 163 (1½). — Biodynamics of Physical Activity
PHED 164 (1½). — Dynamics of Motor Skill Acquisition
PHED 200 (1½). — Analysing Performance in Team Sports
PHED 261 (1½). — Leisure and Sport in Canadian Society
PHED 284 (1½). — Physical Growth and Motor Development
One of:
PHED 310 (1½). — Performance Analysis of Selected Individual Sports and Activities
PHED 320 (1½). — Performance Analysis of Selected Team Sports and Activities
PHED 391 (3). — Human Functional Anatomy and Applied Physiology

These core courses are normally to be taken in First and Second Years, except that 1½ units from either PHED 310 or 320 shall be taken in Third or Fourth Year.

2. **Performance Requirement**
For the Bachelor of Physical Education Degree, students must demonstrate knowledge and skill in a minimum of three performance competency tests in activities approved by the School of Physical Education and Recreation. A written and practical test must be passed (65%) in each of the following performance areas: aquatics, individual sports/activities, and team sports/activities. Normally, students should complete this requirement before the end of Second Year. Arrangements to take tests should be made with the performance competency coordinator two weeks prior to the testing periods scheduled in September, January, and March of each academic year.

COURSE OF STUDIES

Each student is required to elect an approved program of study in one of the seven areas listed below. The required courses for each program are given by years and in accompanying notes; year-listings are recommended, and should be followed as closely as possible. Students are cautioned to take due notice of prerequisites for upper level courses. Program approval is required prior to registration each year. **The following Notes apply to all programs of study:**

1. Recommended for the 3 units of 200-level or higher English courses: ENGL 301 and 302, or 303.
2. A total of 24 to 33 units of Arts, Science and/or Commerce courses is required, including 6 units of English. A minimum of 6 units of 300- or 400-level courses must be taken within one general area of Arts, Science, or Commerce.
3. **Teacher Certification Program:** requirements for the Faculty of Education Teacher Certification programs in Physical Education are given in the Faculty of Education section of the Calendar.
4. **Adapted Physical Activity:** up to 7½ units in adapted physical activity may be included in the Exercise Science, Motor Performance and Control, Leisure Studies, and General Studies programs. Students in the professionally-oriented programs are encouraged to include one or more courses in adapted physical activity in their programs.
5. Students intending to enter Graduate Studies (M.P.E.) should take PHED 371 or approved equivalent.

EXERCISE SCIENCE

For students seeking a background in the biological and physical sciences and their application to the study of human physical activity.

Year 1		Year 2	
ENGL 100	3	ENGL	3
First-Year BIOL, CHEM MATH, PHYS	9	Arts/Science	6
PHED 110	1½	PHED 103, 161	3
PHED 163, 164	3	PHED 261	1½
	16½	PHED 391	3
			16½
Year 3		**Year 4**	
Arts/Science	6	Arts/Science	3-6
PHED 200, 284	3	PHED 463, 468	3
PHED 310/320 (Core)	1½	PHED 499	1½
PHED 363, 370, 371	4½	Program Electives (PHED)	6-3
Program Elective (PHED)	1½	PHED Electives	3
	16½		16½

MOTOR PERFORMANCE AND CONTROL

For students seeking a background in individual behavior and its application to the study of human physical activity.

Year 1		Year 2	
ENGL 100	3	ENGL	3
PSYC 100	3	PSYC 200	3
BIOL 101 or 102	3	Arts/Science Elec[1]	3
PHED 103, 110	3	PHED 200, 261, 284	4½
PHED 161, 163, 164	4½	PHED 391	3
	16½		16½
Year 3		**Year 4**	
PSYC (300- and 400-level courses)	6	PSYC (300- and 400-level courses)	3
PHED 310/320 (Core)	1½	Arts/Science Elec[1]	1½-4½
PHED 364, 368	3	PHED 468, 499	3
PHED 370, 371	3	Program Electives (PHED)[2]	4½-7½
Program Elective	1½	PHED Elective	1½
PHED Elective	1½		
	16½		16½

NOTES: 1. Selected to supplement chosen area of interest. All program electives should be selected in consultation with a Faculty Program Adviser.
2. PHED 489 (Seminar) is strongly recommended.

LEISURE STUDIES

For students seeking a background in the social sciences and their application to the study of leisure, sport and physical activity.

Year 1		Year 2	
ENGL 100	3	ENGL	3
HIST 135	3	PHIL 115, ECON 100, or ANTH 200	3
SOCI 200	3	Arts/Science	3
PHED 103, 110	3	PHED 200, 261, 284	4½
PHED 161, 163, 164	4½	PHED 391	3
	16½		16½
Year 3		**Year 4**	
Arts/Science	6	Arts/Science	3
PHED 310/320 (Core)	1½	PHED 371[2], 499	3
Program Required (PHED)[1]	9	Program Electives (PHED)[3]	7½
		PHED Electives	3
	16½		16½

NOTES: 1. 9 units selected from PHED 340, 360, 367, 374, 375, 380, 381, 382, 383.
2. 1½ units of research methods shall be selected from PHED 371, SOCI 380, or an equivalent course; for purposes of illustration, PHED 371 is chosen in the year-course listings.
3. PHED 489 (Seminar) is strongly recommended.

HEALTH AND FITNESS

For students who are interested in pursuing a career in the broad domain of health and fitness promotion.

Year 1		Year 2	
ENGL 100	3	ENGL	3
Arts/Science[1]	6	Arts/Science/Commerce[1, 3]	6
PHED 103, 110	3	PHED 200, 261, 284	4½
PHED 161, 163, 164	4½	PHED 391	3
	16½		16½

Year 3		Year 4	
Arts/Science/Commerce[1, 3]	6	Arts/Science/Commerce[1, 3]	3
PHED 310/320 (Core)	1½	PHED 355, 461, 463	4½
PHED 303, 352	3	PHED 464, 469	3
PHED 361, 363, 370	4½	Program Electives (PHED)[4]	4½
PHED Elective	1½	PHED Elective	1½
	16½		16½

NOTES: 1. 21 units of Arts, Science, and/or Commerce courses, to include one of the following specializations:
a) BIOL 101 or 102; PSYC 100 and 200; 6 units of 300- and/or 400-level Psychology courses;
b) BIOL 101 or 102; PSYC 100; SOCI 200; 6 units of 300- and/or 400-level Sociology courses;
c) ECON 100; COMM 329, 396, 457, 458[2];
d) 6 units of First-year courses in BIOL, CHEM, MATH, PHYS; 6 units of 300- and/or 400-level science courses offered for credit in the Faculty of Science.
2. Students should consult the Commerce faculty for recommended background courses.
3. HUNU 205 and 209 (Nutrition courses) are strongly recommended.
4. Students are encouraged to select from PHED 364, 365, 369, 392, 400, 471, 489 (specific HEFI sections).

INSTRUCTION AND COACHING

For students pursuing a comprehensive background in the areas of instructional and coaching effectiveness. The Instruction specialization is strongly recommended for those students who wish to pursue careers as instructors or teachers in community or school settings.[1]

Year 1		Year 2	
ENGL 100	3	ENGL	3
Arts/Science[2]	6	Arts/Science/Commerce[2]	6
PHED 103, 110	3	PHED 200, 261, 284	4½
PHED 161, 163, 164	4½	PHED 391	3
	16½		16½
Year 3		**Year 4**	
Arts/Science/Commerce[2]	3	Arts/Science/Commerce[2]	3-6
PHED 310/320 (Core)	1½	PHED 361, 364	3
PHED 355, 368, 369	4½	PHED 310/320	1½
PHED 370, 392	3	Program Required (PHED)[3]	3
PHED 310/320	1½	Program Electives (PHED)[4]	3-0
Program Required (PHED)[3]	3	PHED Electives	3
	16½		16½

NOTES: 1. To be eligible for acceptance into the Faculty of Education Teacher Certification program, students must complete both the 9-unit Required component of PHED 355, 368, 369, 392, 3 units of 310/320; **and** the performance competencies requirement of the Instructional specialization of this program.
2. A second concentration in a teaching area acceptable to the Faculty of Education is strongly recommended.
3. Students shall select one of the following specializations:
a) **Instruction:** PHED 362; PHED 400; 1½ units from PHED 363 or 463; 1½ units from PHED 310, 320 or 420; 0-3 units of PHED courses[4]. Seven performance competencies are required for this specialization; at least one must be selected from each of: Team Games, Dance, Gymnastics, and Aquatics.
b) **Coaching:** PHED 363, 365, 420, 463; 0-3 units of PHED courses[4].
4. Students may substitute up to 3 units of PHED courses from their specialization elective units to meet the Faculty of Education 2nd concentration requirement.

LEISURE AND SPORT ADMINISTRATION

For students interested in leisure and sport administration, both public and private, and more specifically the policies and organization of leisure, sport, and physical activity.

Year 1		Year 2	
ENGL 100	3	ENGL	3
ECON 100	3	COMM 329	1½
Arts/Science	3	Arts/Science	4½
PHED 103, 110	3	PHED 200, 261, 284	4½
PHED 161, 163, 164	4½	PHED 391	3
	16½		16½
Year 3		**Year 4**	
Commerce 457, 458	3	Commerce 396	2
Arts/Science/Commerce[1]	2½	Arts/Science/Commerce	1½
PHED 310/320 (Core)	1½	PHED 355, 400, 492	4½
PHED 360, 364	3	Program Electives (PHED)[2]	6
PHED 375, 392	3	PHED Electives	3
Program Electives (PHED)[2]	3		
	16		17

NOTES: 1. The selection of a 2½ unit course or courses adding up to 2½ units is very rare and as such students may be required to take 3 units of Art/Science/Commerce electives in Third Year. This anomaly in unit total is caused by the 2 unit value of Commerce 396 in Fourth Year.
2. Students shall select one of the following specializations:
a) **Society and organizations with reference to leisure and sport:**
6 units from PHED 355, 367, 374, 380, 381, 382, 383, 489, 499; 1½ units from Research Methods; 1½ units from Specialization b).
b) **Individuals and groups with reference to sport and physical activity:**
4.5 units from PHED 334, 355, 361, 362, 365, 368, 489, 499; 1½ units from 310, 320, or 420; 1½ units from Research Methods; 1½ units from Specialization a).

GENERAL STUDIES IN PHYSICAL EDUCATION

For students who do not choose to select one of the more specialized programs. This general program provides more flexibility than is found in other programs, and allows students to select portions of more than one program.

Year 1		Year 2	
ENGL 100	3	ENGL	3
Arts/Science	6	Arts/Science/Commerce	6
PHED 103, 110	3	PHED 200, 261, 284	4½
PHED 161, 163, 164	4½	PHED 391	3
	16½		16½
Year 3		**Year 4**	
Arts/Science/Commerce	3-6	Arts/Science/Commerce	3-6
PHED 310/320 (Core)	1½	PHED 370	1½
PHED 364, 368	3	Program Required (PHED)[1]	6
Program Required (PHED)[1]	3	Program Electives (PHED)[2]	4½-1½
Program Electives (PHED)	4½-1½	PHED Elective	1½
PHED Elective	1½		
	16½		16½

NOTES: 1. Students shall select 9 units as follows:
3 units from PHED 363, 463, 468; 3 units from PHED 360, 380, 381, 382; 3 units from PHED 310, 320.
2. PHED 499 (Project) is recommended.

Requirements for the Degree of M.P.E.

Prerequisite: 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).

THE SCHOOL OF REHABILITATION MEDICINE

(A School within the Faculty of Medicine)

ACADEMIC STAFF

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P. FURMINGER, Dip. (O.T.) (London).
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B. GORDON, Dip. (O.T.) (Man.).
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C. WILCOX, Dip. (P.&O.T.), B.Sc. (Rehab. Med.) (Toronto).
P. WOODLIFFE, B.Sc. (O.T.) (W. Ont.).

THE SCHOOL OF REHABILITATION MEDICINE

Programs of Study

The School of Rehabilitation Medicine provides professional preparation in the rehabilitation sciences, and awards the degrees of Bachelor of Science in Occupational Therapy — B.Sc. (O.T.) and the Bachelor of Science in Physical Therapy — B.Sc. (P.T.).

Practice in Occupational Therapy and Physical Therapy

Occupational therapy and physical therapy are health professions primarily concerned with reducing the effects of impairment or disability on a person's ability to move and function in everyday life. Functional impairment and disability may result from injury, disease, developmental disorders, or the aging process, and may affect a person's physiological systems, sensation, movement, or emotional or intellectual function.

In many settings, therapists serve as members of a team of rehabilitation specialists, including physicians, nurses, social workers, special educators, speech pathologists and psychologists. Occupational Therapists and Physical Therapists may work in hospitals, rehabilitation centres, psychiatric institutions, industrial facilities, government and voluntary health agencies, schools, extended care facilities, the patient's home, or in private practice.

Occupational Therapists are concerned with the effects of various conditions on the life performance of their patients. Following a thorough assessment of the patient's abilities and skills, occupational therapists implement treatment and intervention programs which enable maximum independence in the home, community or workplace. They do so through the use of carefully graded activities designed to increase functional skills, through prescription of adaptive aids and devices, through recommendation of appropriate modifications in the living environment, and through other educational and training strategies which address physical, psychological, or cognitive deficits interfering with the daily occupations of self-care, work, and play.

Physical Therapists specialize in problems related to movement. The more common movement disorders result from impairment of neuromuscular, musculoskeletal, respiratory or cardiovascular systems. Following assessment of their patients, they often use physical agents such as heat, cold, electrical stimulation and therapeutic exercise to increase muscle strength and function, reduce pain, promote general health and fitness, and prevent disability. As specialists in movement dysfunction, Physical Therapists also provide expertise in human mobility, carefully analyzing gait patterns and prescribing treatment regimens or devices (such as braces, crutches or wheelchairs) to enable patients to move independently through their environments.

General Information

Degree programs in the School of Rehabilitation Medicine typically require four years of education beyond high school. Prerequisites, which usually require one or more years of study, may be completed at The University of British Columbia or any other accredited university or at a community college. For those admitted to the professional programs in the School, the second, third and fourth years of study for the degree are completed in the School of Rehabilitation Medicine and at affiliated health care facilities in British Columbia and across Canada. Because of the nature of the curricula, pursuit of the degrees offered by the School must be on a full-time basis. Where any of the required courses for these programs have been completed prior to admission to the School, advance standing may be granted.

Admission

Application for admission to the School of Rehabilitation Medicine will be considered for an applicant who has completed the following subjects, or their 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, Psychology 100. In addition high school Physics 11 is required. Students are required to have an overall academic standing of 70% (G.P.A. 2.8) based on all university or college courses which are accepted for transfer at U.B.C. This G.P.A. is calculated on courses taken in the seven (7) years prior to application. **NOTE: Physical Therapy Program only** — Normally, the pre-requisites for entrance must be completed in these same seven (7) years.

Because of limitations in clinical placements and facilities, class sizes must be restricted. Admission to the School of Rehabilitation Medicine is based on a selection process which strives to enrol the most highly qualified applicants. Selection is based on completion of prerequisites, academic standing, maturity, and personal suitability. Personal characteristics are judged through interviews and letters of reference. Two letters of reference are required, of which one must be from a person knowledgeable about the applicant's service as a volunteer or as an employee in a setting in which the applicant has had contact with disabled people. Primary consideration is given to residents of British Columbia. Students are notified if they qualify for a personal interview.

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 - Koerner Pavilion, 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 May 31.

Costs Other Than Sessional Fee

Students should be prepared for the additional expenses required in these professional programs, including costs associated with uniforms, travel, clinical fieldwork and books. Up-to-date information about these supplemental expenses is available from the School.

Since some clinical fieldwork placements are located outside Vancouver, students should include the additional costs associated with travel, meals and accommodation for such placements in estimating total expenses. Because of the requirements for travel associated with the various levels of clinical fieldwork placements within Vancouver and the Lower Mainland, students should be prepared to arrange for convenient transportation (preferably access to a car) in order to minimize the time and effort necessary to meet their obligations for these educational experiences.

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).

Students (including transfer students) who have obtained credit for English 100 but who have not passed the ECT will write it at the first available sitting (i.e., September). The Test will also be given during the December examination period, in late March 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.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

(1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.

(2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

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
Biology 353, 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
OR	
Sociology 210, Canadian Social Structure	3 units
OR	
Sociology 220, Sociology of Life-Styles	3 units
RHME 201, Kinesiology	1½ units
RHME 205, Devices/Equipment	1 unit
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 C certificate. **In addition, students will be required to show proof of current certification in BCLS Basic Level C 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 307, Occupational Therapy, Psychosocial Dysfunction .. 2 units
RHME 311, Interpersonal Communication in Rehabilitation ..... ½ unit
RHME 312, Tests and Measures in Occupational Therapy ..... 1 unit
RHME 322, Occupational Therapy, Biomechanical Treatment Approaches ..... 2 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 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 423, Occupational Therapy in Neurorehabilitation ..... 1½ units
RHME 424, Occupational Therapy, Program Design ..... 1 unit
RHME 425, Occupational Therapy, Social and Professional Issues 0 units
RHME 426, Occupational Therapy, Independent Study ..... 1½ units
OR
RHME 436, Occupational Therapy, Ergonomics and Organization of Activity ..... 1½ units
RHME 432, Occupational Therapy, Group Intervention ..... 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
Biology 353, 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
OR
Sociology 210, Canadian Social Structure ..... 3 units
OR
Sociology 220, Sociology of Life-Styles ..... 3 units
RHME 201, Kinesiology ..... 1½ units
RHME 203, Physical Therapy, Clinical Skills ..... 1 unit
RHME 205, Devices/Equipment ..... 1 unit
RHME 206, Physical Treatment of the Musculo-skeletal System 1½ units
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 C certificate. **In addition, students will be required to show proof of current certification in BCLS Basic Level C 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, Interpersonal Communication in Rehabilitation ..... ½ 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, Selected Topics in Physical Therapy ..... 1 unit
RHME 412, Physical Therapy, Management of the Cardiovascular and Peripheral Vascular Systems 1 unit
RHME 413, Physical Therapy, Comprehensive Patient Management ..... 3 units
RHME 414, Physical Therapy, Social and Professional Issues ... 0 units
RHME 415, Physical Therapy, Independent Study ..... 1½ units
RHME 417, Health Care Systems ..... ½ unit
RHME 419, Exercise Physiology in Health and Disease ..... 1½ units
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 clinical facility and the School.

Examinations:

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 term. 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 RHME course is 60%. Examinations will be graded as follows: First Class—80%; Second Class—65%; Pass—60%; Fail—below 60%.

Advancement:

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 repeat the work of the entire year.

If the progress of the student has been satisfactory, 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 Head of the Divisions concerned about such arrangements.

If the student satisfies the requirements of the Division concerned and passes each supplemental RHME 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.

Ethical and professional behaviour is expected of students at all times in both academic and clinical coursework required for the degrees. The School reserves the right to recommend for dismissal any student whose behaviour is deemed to be unprofessional or inconsistent with the responsible, competent, humanitarian and compassionate provision of health care.

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. A *minimum* of one four- to eight-week clinical fieldwork placement is required to be completed outside of the Greater Vancouver area. Students are responsible for all 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. These courses are completed on a full-time basis between May and August after Second year.

RHME 330/335 (18 weeks/12 weeks) — A student failing to complete these courses satisfactorily may be granted permission to advance to Fourth Year only on the recommendation of the Promotions Committee. These courses are completed on a full-time basis, in blocks, between May and August after Third 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. These courses are completed in two full-time blocks during the academic year.

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, physical therapy graduates will be eligible for membership in the Physiotherapy Association of British Columbia (P.A.B.C.) and the Canadian Physiotherapy Association (C.P.A.).

Occupational therapy graduates must complete all academic courses, clinical fieldwork requirements, and pass the Canadian Association of Occupational Therapists (C.A.O.T.) Certification Examination in order to be eligible for membership in C.A.O.T. and the British Columbia Society of Occupational Therapists (B.C.S.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 26 designated units in the Occupational Therapy Program or 27 designated units in the Physical Therapy Program as outlined below.

After 1990, applicants for a second degree in the School of Rehabilitation Medicine will be considered along with all other applicants to second year. If admitted for the second degree they may be given credit for core courses completed within the preceding five years.

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 416	(1½)
		RHME 307	(2)	RHME 418	(1)
		RHME 312	(1)	RHME 423	(1½)
		RHME 322	(2)	RHME 424	(1)
		Elective	(1½)	RHME 425	(0)
				RHME 426 OR	
				RHME 436	(1½)
				RHME 432	(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 203	(1)	RHME 304	(1)	RHME 405	(1)
RHME 206	(1½)	RHME 305	(1½)	RHME 411	(1)
RHME 208	(1½)	RHME 308	(1)	RHME 412	(1)
		RHME 313	(1)	RHME 413	(3)
		RHME 314	(1½)	RHME 414	(0)
				RHME 415	(1½)
				RHME 419	(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.

THE FACULTY OF SCIENCE

ACADEMIC STAFF

Office of the Dean

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Department of Biochemistry—See Faculty of Medicine.

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Department of Geography—See Faculty of Arts

Department of Geological Sciences

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J. ATHWAL, B.Sc., M.Sc. (Kurukshetra U.), Ph.D. (Guru Nanak Dev. U.).
D. A. BONN, B.Sc., Ph.D. (McMaster).
D. ELIEZER, B.A. (Princeton), Ph.D. (Calif., Santa Barbara).
M. GRUWEL, Doctoraal Diplom (Leiden), Ph.D. (Dalhousie).
S. HABIB, M.S. (Ind. Inst. of Tech.), M.S., Ph.D. (Maryland).
T. HSU, Ph.D. (Princeton).
A. KOVNER, B.Sc., M.Sc., Ph.D. (Tel Aviv).
R. LAFLAMME, B.Sc. (Laval), Ph.D. (Cantab.).
I. MUKHOPADHYAY, B.Sc., M.Sc. (Burdwan), M.Tech. (Ind. Inst. of Tech.), Ph.D. (New Brunswick).
T. PFIZ, Diplom (Stuttgart), Ph.D. (Max-Planck-Inst.).
J. RAMMER, Master (Linz), Ph.D. (Bayreuth).
B. ROSENSTEIN, B.A. (Hebrew U.), M.A., Ph.D. (Tel Aviv).
A. SCHAKEL, Ph.D. (Amsterdam).
J. THEWALT, B.Sc., Ph.D. (Simon Fraser).
H. ZHOU, B.Sc. (Huazhong Inst. of Techn.), M.Sc., Ph.D. (Calif., San Diego).

Department of Psychology—See Faculty of Arts

Department of Statistics

Professor and Head of the Department
A. J. PETKAU, B.Sc. (Manitoba), Ph.D. (Stanford).

Professors
M. SCHULZER, M.A., M.D. (Brit. Col.), Ph.D. (Washington).
J. V. ZIDEK, B.Sc., M.Sc. (Alta.), Ph.D. (Stanford).

Associate Professors
F. P. GLICK, A.B. (Oberlin), M.S., Ph.D. (Stanford).
N. E. HECKMAN, B.Sc. (Tufts), M.A., Ph.D. (Mich.).
H. JOE, B.Sc. (Victoria), M.Sc. (Brit. Col.), Ph.D. (Florida).

Assistant Professors
M. DELAMPADY, B.Sc., M.Sc. (Indian Statistical Institute), Ph.D. (Purdue).
J. LIU, B.S. (Zhongshan), M.S. (Jinan), Ph.D. (Colorado State).
R. ZAMAR, B.Sc. (Cordoba), M.Sc. (Pernambuco), Ph.D. (Washington).

Associate Members
P. DE JONG, Associate Professor, Commerce.
P. E. GREENWOOD, Professor, Mathematics.
M. L. PUTERMAN, Professor, Commerce.

Adjunct Professors
A. J. COLDMAN, B.Sc. (Sussex), M.A. (Western Ontario), Ph.D. (Brit. Col.).
C. VAN EEDEN, B.Sc., M.Sc., Ph.D. (Amsterdam).

Department of Zoology

Professor and Head of the Department
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.

Honorary Professors
A. B. ACTON, M.A., D.Phil. (Oxon).
D. H. CHITTY, B.A. (Toronto), M.A., D.Phil. (Oxon), F.R.S.C.
I. McT. COWAN, O.C., B.A. (Brit. Col.), Ph.D. (Calif.), D.Sc. (Brit. Col.), LL.D. (Alta., S. Fraser), D.Env.Sc. (Waterloo), F.R.S.C.
P. A. DEHNEL, M.A., Ph.D. (Calif.).
C. V. FINNEGAN, B.A. (Bates), M.S., Ph.D. (Notre Dame).
H. D. FISHER, B.A., M.A. (Brit. Col.), Ph.D. (McGill).
W. S. HOAR, O.C., B.A. (New Brunswick), M.A. (Western Ontario), Ph.D. (Boston), D.Sc. (New Brunswick, Memorial, St. Francis Xavier, W. Ont.), LL.D. (S. Fraser, Toronto), F.R.S.C.
P. A. LARKIN, M.A. (Sask.), D.Phil. (Oxon), F.R.S.C., University Professor.
C. C. LINDSEY, B.A. (Toronto), M.A. (Brit. Col.), Ph.D. (Cantab.), F.R.S.C.
H. C. NORDAN, B.S.A., M.A. (Brit. Col.), Ph.D. (Oregon State).

Professors
J. M. GOSLINE, B.A. (Calif.), Ph.D. (Duke).
T. A. GRIGLIATTI, B.S. (Santa Clara), M.A. (San Francisco State), Ph.D. (Brit. Col.).
P. W. HOCHACHKA, B.Sc. (Alta.), M.Sc. (Dalhousie), Ph.D. (Duke), F.R.S.C.
D. G. HOLM, B.Sc. (Brit. Col.), Ph.D. (Connecticut).
D. R. JONES, B.Sc. (Southampton), Ph.D. (East Anglia), F.R.S.C.
C. J. KREBS, M.A., Ph.D. (Brit. Col.), D.Sc. (Lund), F.R.S.C.
A. G. LEWIS, B.Sc., M.Sc. (Miami), Ph.D. (Hawaii).
N. R. LILEY, M.A., D.Phil. (Oxon).
D. LUDWIG, Ph.D. (Calif.).
J. D. McPHAIL, M.Sc. (Brit. Col.), Ph.D. (McGill).
J. H. MYERS, B.Sc. (Chatham Coll.), M.Sc. (Tufts), Ph.D. (Indiana).
T. G. NORTHCOTE, M.A., Ph.D. (Brit. Col.).
T. R. PARSONS, M.Sc., Ph.D. (McGill), F.R.S.C.
A. M. PERKS, M.A. (Cantab., Oxon), Ph.D. (St. Andrew's).
J. E. PHILLIPS, M.Sc. (Dalhousie), Ph.D. (Cantab.), F.R.S.C.
D. J. RANDALL, B.Sc., Ph.D. (Southampton), F.R.S.C.
A. R. E. SINCLAIR, B.Sc., Ph.D. (Oxon).
J. N. M. SMITH, B.Sc. (Edinburgh), D.Phil. (Oxon), Curator of Cowan Vertebrate Museum.
H. F. STICH, B.A. (Jena), Ph.D. (Wurzburg).
D. SUZUKI, O.C., B.A. (Amherst), Ph.D. (Chicago), LL.D. (P.E.I.), D.Sc. (Acadia), F.R.S.C.
C. J. WALTERS, B.S. (Humboldt State), M.S., Ph.D. (Colorado State).
N. J. WILIMOVSKY, B.S., M.A. (Mich.), Ph.D. (Stanford), Curator of the Ichthyological Museum.

Associate Professors
J. D. BERGER, A.M., Ph.D. (Indiana).
R. W. BLAKE, B.Sc. (Bristol), Ph.D. (Cambridge).
H. W. BROCK, B.Sc. (Brit. Col.), D.Phil. (Oxf.).
T. H. CAREFOOT, M.Sc. (Brit. Col.), Ph.D. (Wales).
C. L. GASS, A.B., B.Sc. (Chico State Coll.), M.Sc., Ph.D. (Oregon).
H. E. KASINSKY, B.A. (Columbia College, N.Y.), Ph.D. (Calif.).
W. K. MILSOM, B.Sc. (Alta.), M.Sc. (Wash.), Ph.D. (Brit. Col.).
W. E. NEILL, B.A. (Rutgers), M.A., Ph.D. (Texas).
J. D. STEEVES, B.Sc., Ph.D. (Manitoba).
C. F. WEHRHAHN, M.Sc. (Alberta), Ph.D. (Calif.).

Assistant Professors
M. L. ADAMSON, B.Sc., Ph.D. (Guelph).
M. JACKSON, B.A. (Toronto), M.A. (Brit. Col.).
D. G. MOERMAN, B.Sc., Ph.D. (Simon Fraser).
D. SCHLUTER, B.Sc. (Guelph), Ph.D. (Michigan).
T. P. SNUTCH, B.Sc., Ph.D. (Simon Fraser).

Senior Instructor
P. ELLICKSON, M.Sc. (Brit. Col.).

Lecturers
T. CRAWFORD, B.Sc. (Victoria), M.Sc., Ph.D. (Washington, Seattle).
L. FIDLER, B.Sc. (Pennsylvania State), M.Sc., Ph.D. (Brit. Col.).
M. W. HAWKES, B.Sc., Ph.D. (Brit. Col.).
C. A. MacDONALD, B.Sc., M.Sc. (Brit. Col.).
S. MILLEN, B.Sc. (Victoria), M.Sc. (Simon Fraser).
C. POLLOCK, B.Sc., M.Sc. (Manitoba), Ph.D. (Brit. Col.).
A. R. RODGERS, B.Sc., Ph.D. (York).
E. VIZSOLYI, B.Sc. (Eotvos Lorand), M.Sc., Ph.D. (Brit. Col.).

Adjunct Professor
E. M. DONALDSON, B.Sc. (Sheffield), Ph.D. (Brit. Col.), D.Sc. (Sheffield).

Research Associates
A. BILLY, B.Sc., M.Sc. (Brit. Col.), Ph.D. (Texas).
R. CAMFIELD, B.Sc. (Monash), Ph.D. (Brit. Col.).
H. CHING, B.A., M.S. (Oregon), Ph.D. (Nebraska).
M. FITZ-EARLE, B.Sc. (Nottingham), M.Sc., Ph.D. (Toronto).

J. K. B. FORD, B.Sc., Ph.D (Brit. Col.).
W. G. GIBSON, B.A. (Sask.), Ph.D. (Brit. Col.).
M. R. HUGHES, B.A. (Harpur College), M.A., Ph.D. (Duke).
M. K. LALLI, B.Sc., B.Ed., M.A. (Bowling Green), Ph.D. (Wash.).
C. D. LEVINGS, B.Sc., M.Sc. (Brit. Col.), Ph.D. (Dalhousie).
M. A. LILLIE, B.Sc., M.Sc. (Queens), Ph.D. (Western Ontario).
J. MARTIN, M.Sc. (Brit. Col.).
T. ROGALSKI, B.Sc., Ph.D. (Simon Fraser).
M. P. ROSIN, B.Sc. (Saskatchewan), Ph.D. (Toronto).
D. A. R. SINCLAIR, B.Sc., M.Sc. (Manitoba), Ph.D. (Brit. Col.).
P. SLANEY, M.Sc. (Brit. Col.).
R. K. SUAREZ, B.Sc. (Manila), M.Sc. (Philippines), Ph.D. (Brit. Col.).
M. TAITT, B.Sc. (London), M.Sc. (Durham), Ph.D. (Brit. Col.).
A. TAUTZ, M.Sc., Ph.D. (Brit. Col.).
S. S. TSANG, B.Sc. (McGill), M.Sc., Ph.D. (Brit. Col.).

NSERC University Research Fellow
J. R. POST, B.Sc. (Toronto), M.Sc., Ph.D. (York).

Post-doctoral Fellows
P. ARCESE, B.A. (Washington, Seattle), M.Sc., Ph.D. (Brit. Col.).
P. G. ARTHUR, Ph.D. (Western Australia).
C. BENKMAN, B.A. (Calif., Berkeley), M.Sc. (N. Ariz.), Ph.D. (New York State, Albany).
P. G. BUSHNELL, B.S. (Maryland), M.S. (Miami), Ph.D. (Hawaii).
J. M. HARRISON, Ph.D. (Colorado).
D. S. HENSHEL, A.B., B.S. (Brown), Ph.D. (Washington).
K. M. KEIVER, B.Sc. (Brit. Col.), M.Sc., Ph.D. (Guelph).
M. LUTCAVAGE, B.A. (Pennsylvania), M.Sc. (College William & Mary), Ph.D. (Miami).
A. PABST, B.Sc. (Maryland), Ph.D. (Duke).
C. M. ROGERS, B.S. (Wisconsin, Milwaukee), M.S. (Michigan State), Ph.D. (Indiana).
O. J. SCHMITZ, B.Sc., M.Sc. (Guelph), Ph.D. (Michigan).
YONG TANG, Ph.D. (Dalhousie).
E. TEMELES, A.B. (Cornell), M.Sc. (Louisiana State), Ph.D. (Calif., Davis).
J. A. WILLIAMS, B.Sc. (Victoria), Ph.D. (Alberta).

Associate Members
N. AUERSPERG, Professor, Anatomy.
W. JEFFERIES, Assistant Professor, Biotechnology and Microbiology.
D. M. WEBSTER, Assistant Professor, Rehabilitation Medicine.

THE FACULTY OF SCIENCE

The B.Sc. degree can be earned in the following fields:

AQUACULTURAL SCIENCE	COMPUTER SCIENCE	NUTRITIONAL SCIENCE
ASTRONOMY	GENERAL SCIENCE	OCEANOGRAPHY
ATMOSPHERIC SCIENCE	GEOGRAPHY	PHARMACOLOGY
BIOCHEMISTRY	GEOLOGY	PHYSICS
BIOLOGY	GEOPHYSICS	PHYSIOLOGY
CHEMISTRY	MATHEMATICS	PSYCHOLOGY
	MICROBIOLOGY	STATISTICS

A Diploma in Meteorology is also offered by the Faculty of Science (see entry following Atmospheric Science degree).

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 provides a broad education in science, with the opportunity for some specialization in either one or two of the following areas: Chemistry, Earth Science, Life Science, Mathematical Science and Physics. This program is appropriate and useful for those going on in other professional areas, such as Dentistry, Law, Medicine or Veterinary Medicine. The General Science route that requires concentrations in two areas, provides excellent preparation for prospective secondary school teachers. This program is not normally intended for students planning to continue with graduate study in science. However, with careful planning and sufficiently high standing it is possible to go on to graduate study, but this may require additional qualifying studies at some universities.

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 one of: Biology 12, Chemistry 12, Computer Science 12, Geology 12, or Physics 12. Other courses should be chosen from: Biology 11, 12, Chemistry 12, Computer Studies 11, Computer Science 12, Earth Science 11, Geology 11, 12, Geometry 12, Physics 12, and Probability and Statistics 12.

For information about advanced placement or advanced credit for courses taken in the International Baccalaureate or Advanced Placement programs, consult the Office of the Registrar (Admissions).

Applicants who cannot meet the requirements exactly as specified should submit a special appeal to the Office of the Registrar with their application forms. The Dean, who has discretionary powers on admissions, will consider all appeals.

All new applicants to the University must pay a $15.00 (Canadian) Application Processing Fee at the time of their initial application.

Students with educational documents issued outside the Province of British Columbia must pay an additional evaluation fee of $10.00. 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 1.

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 material mailed to the students with their Letter of Acceptance (new students) or Transcript (returning students).

a) *First-year students:* First-year students are not required to choose a program or specialization or to obtain program approval before registering through **Telereg**. Students should be careful, however, to select elective units appropriate to the program they plan to enter in Second year. Students should seek advice from the Office of the Dean of Science if their First-year program is nonstandard because of advanced placement or transfer credit.

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. Returning students are advised to obtain program advice before the end of the second term. All study programs are subject to 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.

After the close of Telereg, 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 1 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.

For some courses in the International Baccalaureate and Advanced Placement enriched secondary school programs, advanced placement and/or credit may be granted. This will be noted on a student's notification of acceptance to UBC. Such students are advised to consult departmental advisers at UBC before registering in any Second Year level courses.

Students transferring to the Faculty of Science from other Faculties at the University of British Columbia must consult the Dean regarding 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. Geography courses designated as carrying Science Credit are numbered 01-09 in the last digits. (Geography 449 also carries Science Credit, but only for B.Sc. Honours students in Geography.) 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, Theatre, School of Family and Nutritional Sciences, and School of Music) are not applicable. A list of applicable courses in these Departments and Schools is available for viewing in the Office of the Dean of Science. Courses designated HUNU may not be used to satisfy the Arts requirement. The Arts requirement can be met by Geography courses numbered 20 and above in the last two digits **except** those numbered 40-48 and 70-79 in the last two digits. Geography courses numbered 10-19, 40-48, 70-79 in the last two digits are not designated as either Science or Arts and may not be included in the minimum 36 units of Science and 9 units of Arts required by the B.Sc. program. They may however be included, with due regard to prerequisites, in the required 21 units of courses in Arts and Sciences numbered 300 or higher.

(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) Other Credit: A few courses in Faculties other than Science or Arts are acceptable for credit towards the B.Sc. degree in certain programs. A list of such courses is available for viewing in the Office of the Dean of Science. Students should note that these courses may not replace specific courses in a Science program or count toward the 36 units of Science and the 9 units of Arts courses required by the B.Sc. program. Furthermore, courses for Other Credit may not be included in the 15 units of Science or the 21 units of Arts and Science numbered 300 and above. Courses designated HMEC do not count for credit towards the B.Sc. degree. **Students are responsible for ensuring that any course in a Faculty other than Arts or Science, and not specified in their program of study, is acceptable for credit towards the B.Sc.** Any exception to the above, or the inclusion of courses not listed in the Program description, may be made only with the prior written permission of the Head of the Department offering the program concerned and the Dean of Science.

(f) Students who are accepted by transfer from other institutions must normally complete all further courses at UBC. 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) wherever they were completed, at UBC or any other institution. Transfer students must consult with a departmental or Faculty adviser before registration.

(g) 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 written permission has been obtained from the Dean of Science. Under no circumstances will a student be granted transfer credit for more than six units of upper level course work. Furthermore, although transfer credit allowed by the Dean may be included in the required 21 units of Arts or Science numbered 300 or above, a B.Sc. program must include a minimum of 15 units of upper level UBC Science courses specified by the Major or Honours program.

(h) 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.

(i) **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.

English Composition Requirement

To qualify for the degree of B.Sc. students must satisfy the English Composition Requirement of the Faculty of Science. To do this students 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 at the first available sitting in September. This Test will also be given during the December examination period, in late March 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.

For each sitting of the ECT a student must attach a "Fee Paid" sticker, which must be purchased in advance from the Department of Financial Services for a fee of $10.00. The examination is free, however, for the following:

(1) Transfer students who enter UBC in 1990 may sit the September 1990 ECT without charge.

(2) Students who are enrolled in English 100 may sit their mid-course ECT without charge.

Note: Effective September 1991, students in the Faculty of Science will not be permitted to enrol in the final 15 units of their degree programs until both English 100 and the English Composition Test have been passed. Students should endeavour to pass the ECT at as early a date as possible.

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 103
or GEOGRAPHY 101 or GEOLOGY 105
or GEOPHYSICS 120 plus GEOLOGY 125
or COMPUTER SCIENCE 124, 126 (111, 118) (See Note 1)
or an ARTS ELECTIVE. Suggested courses:

ANTHROPOLOGY 100, 201, 202, 203, 204, 205, 206
ASIAN STUDIES 105, 115, 206
CHINESE 100, 101
CLASSICAL STUDIES 100, 204, 210
CREATIVE WRITING 202
CZECH/SLOVAK 325
ECONOMICS 100
FINE ARTS 100, 125, 181
FRENCH 100, 105, 110, 115, 120
GEOGRAPHY 190, 220, 260
GERMAN 100, 110, 120
GREEK 100, 125
HEBREW 305
HINDI 102, 110
HISTORY 101-171
INDONESIAN 102
ITALIAN 100, 101
JAPANESE 100, 101, 102, 103
KOREAN 102
LATIN 100, 120
LINGUISTICS 100
MUSIC 100, 101, 103, 104, 106, 120, 121
PHILOSOPHY 100, 102, 103, 115, 210
POLISH 110
PORTUGUESE 102
PSYCHOLOGY 100
PUNJABAI 102
RELIGIOUS STUDIES 100, 202, 204
RUSSIAN 100
SANSKRIT 102
SLAVONIC STUDIES 105, 110, 206
SOCIOLOGY 100
SPANISH 100, 110
THEATRE 120, 160
UKRAINIAN 325

Notes:

1. Certain Major and Honours programs require that the fifth course be in Science.

(a) Biology 101 or 102 or 103 is required in the First Year for a Major or Honours in the Life Sciences (Aquacultural Science, Biochemistry, Biology, Microbiology, Nutritional Science, Pharmacology, Physiology and Psychology).

(b) Computer Science 124 and 126 are required for a Major or Honours in Computer Science.

(c) General Program students should take 3 units of introductory Science (in addition to Chemistry, Mathematics and Physics) or 3 units of Arts 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., Biology 103, Mathematics 120/121, Physics 120, special section 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 enter Rehabilitation Medicine after First Year should note that Physics 110, 115 or 120 is a required course in First Year Science, and the entrance requirements for Rehabilitation Medicine cannot be met within the normal First Year program in the Faculty of Science.

5. 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.

6. 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 2: 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 1 (Chemistry 110 or 120; Mathematics 100 and 101, (or 120 and 121); Physics 110 or 115 or 120).

Promotion to Year Level 3: Successful completion of a total of 24 or more units which must include English 100, the 9 required Science units of Year Level 1, and at least 7 additional Science units.

Promotion to Year Level 4: 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 2 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 2 and 3 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 in consultation with an adviser in the Office of the Dean at the beginning of the Second year and each subsequent year.

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 a minimum passing grade 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 in a session will be assigned unless a student meets the following conditions:

— passes in 15 units, or all units attempted (if fewer); OR

— if taking more that 6 units, passes in at least three-fifths of them and obtains an overall average of at least 60% in three-fifths of the units taken; OR

— if taking 6 or fewer units, passses in at least one-half of them.

First and Second Year students who fail a year will not be permitted to re-enrol at U.B.C. to repeat courses failed during the failed year. They will be considered for readmission 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 readmitted 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 examinations (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 1 and Class 2, 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 1, Class 2 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 1, Class 2 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 (W.C.V.M.) was established at the University of Saskatchewan to serve the four western provinces. A pre-veterinary program is required in preparation for admission to the four-year veterinary program at the W.C.V.M., and may be completed at UBC in the Faculty of Science or the Faculty of Agricultural Sciences.

The course requirements for admission to W.C.V.M. are: 3 units each of English, Biology, Biochemistry*, Chemistry, Physics, and Mathematics; 1½ units each of Genetics, Organic Chemistry, and Introductory Microbiology*; and additional electives to complete 30 units. These prerequisites can be met in a number of departments in the Faculty of Science. However, since genetics and certain of the biochemistry courses are offered only in third year, it will normally take longer than the minimum time to meet all requirements.

***Note:** The biochemistry requirement may be satisfied by completion of Biochemistry 300, or Biology 200 and Biology 201, or Biology 201 and Biochemistry 302. Microbiology 200 will satisfy requirements; Microbiology 417 is not acceptable.

Competition for admission to W.C.V.M. is severe, and although pre-veterinary requirements can be met in two years, few applicants are currently admitted with less than 3 years of university coursework. Pre-veterinary students are therefore strongly advised to follow a program that also satisfies the requirements of a B.Sc. program at UBC. For information and program approval contact the Office of the Dean, Faculty of Science. (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:**

BIOL 300	STAT 200
GEOG 374	PSYC 316
PLNT 321	PSYC 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.

Atmospheric Science

1. ATSC 200, GEOG 200, 204, SOIL 204
2. ATSC 300, GEOG 300
3. ATSC 301, GEOG 301
4. ATSC 302, GEOG 302
5. ATSC 303, GEOG 303
6. ATSC 411, OCGY 411
7. ATSC 414, OCGY 414

Chemistry

1. CHEM 103, 110, 120, 150, 151
2. CHEM 201, 205, 208
3. CHEM 202, 205, 208
4. CHEM 201, 251
5. CHEM 201, 252
6. CHEM 203, 230, 260
7. CHEM 250, 310, 335
8. CHEM 251, 262, 304, 305
9. CHEM 252, 304, 305
10. CHEM 255, 304, 305
11. CHEM 306, GEOL 330
12. CHEM 311, 352
13. CHEM 313. 330

Computer Science

1. CPSC 100, 101, 111, 114, 124, 151, FRST 130
2. CPSC 116, 118
3. CPSC 213, ELEC 259
4. CPSC 302, 350, ELEC 258
5. CPSC 313, 315, ELEC 313, 315
6. CPSC 318, ELEC 476
7. CPSC 405, COMM 310
8. CPSC 406, COMM 410, 411
9. CPSC 413, ELEC 476
10. CPSC 414, ELEC 478
11. CPSC 417, ELEC 456
12. CPSC 435, FRST 435

Geography

1. GEOG 101, 330
2. GEOG 200, 204, ATSC 200, SOIL 204
3. GEOG 205, CIVL 418
4. GEOG 213, 306, GEOL 351
5. GEOG 300, ATSC 300
6. GEOG 301, ATSC 301
7. GEOG 302, ATSC 302
8. GEOG 303, ATSC 303
9. GEOG 306, GEOL 351
10. GEOG 308, SOIL 308

Geological Sciences

1. GEOL 105, 125, 150
2. GEOL 206, 256
3. GEOL 226, 256
4. GEOL 304, 354
5. GEOL 351, GEOG 306
6. GEOL 358, 428
7. GEOL 368, 418
8. GEOL 200, 308

Geophysics and Astronomy

1. GEOP 221, PHYS 213
2. GEOP 310, ASTR 310
3. GEOP 315, ASTR 315
4. GEOP 320, PHYS 406
5. GEOP 400, 420
6. GEOP 400, 421

Life Sciences *(Course numbers in parentheses correspond to those in 1987/88 Calendar.)*

1. ANAT 390, 400 (for 3 units)
2. ANSC 321, HUNU 309
3. ANSC 322, HUNU 305 or 307
4. ANSC 323, HUNU 309
5. BIOC 300, BIOL 201 plus BIOC 302, BIOC 303
6. BIOL 101, 102, 103, 344 (310), 345 (311), 346 (313)
7. BIOL 101, 102, 103, FRST 300
8. BIOL 300, PLNT 321
9. BIOL 301, FRST 430, STAT 305
10. BIOL 305 (ZOOL 316), OCGY 309, OCGY 316, MRNE 435
11. BIOL 310 (ZOOL 323), MRNE 446, PSYC 306
12. BIOL 324 (BOTA 311), PLNT 258
13. BIOL 327 (ZOOL 311), PLNT 331
14. BIOL 334, AGSC 213, ANSC 313, FRST 302
15. BIOL 335 (336), MICB 325
16. BIOL 345 (311), 302 (321) and 303 (322), 304 (323)
17. BIOL 346 (313), MICB 200, 417
18. BIOL 351 and 352 (BOTA 330), PLNT 324 and 325
19. BIOL 353 (ZOOL 303), ANSC 320, PHYL 301 and 302 or 303
20. BIOL 400 (422), MICB 400, SOIL 311
21. BIOL 403 (ZOOL 406), OCGY 406
22. BIOL 426 (ZOOL 415), MRNE 412
23. BIOL 451 (BOTA 415), OCGY 415
24. HUNU 203, and 305 plus 307
25. MICB 200, 417, BIOL 346 (313)
26. MICB 325, BIOL 335 (336)
27. MICB 400, BIOL 400 (422), SOIL 311
28. MRNE 446, BIOL 310 (ZOOL 323), PSYC 306
29. OCGY 309, 316, BIOL 305 (ZOOL 316), MRNE 435
30. OCGY 406, BIOL 403 (ZOOL 406)
31. OCGY 415, BIOL 451 (BOTA 415)
32. PCTH 300, 305 (390)
33. PCTH 300, 302
34. PHYL 301 and 302 or 303, BIOL 353 (ZOOL 303), ANSC 320
35. PSYC 200, 260
36. PSYC 304, 360
37. PSYC 316, 366
38. PSYC 413, 463
39. PSYC 416, 466
40. PSYC 306, MRNE 446, BIOL 310 (ZOOL 323)

Mathematics

1. MATH 100, 111, 120, 140, 153
2. MATH 101, 121, 141, 154
3. MATH 152, 221, 223
4. MATH 200, 226, 253
5. MATH 201, 227, 254
6. MATH 205, 302, STAT 205, 251, 302
7. MATH 224, 307
8. MATH 255, 315
9. MATH 257, 316, PHYS 312
10. MATH 300, 321
11. MATH 315 and 316, 323
12. MATH 350, 357

Oceanography

1. OCGY 309, 316, BIOL 305, MRNE 435
2. OCGY 414, 505
3. OCGY 406, BIOL 403
4. OCGY 415, BIOL 451
5. OCGY 411, ATSC 411
6. OCGY 414, ATSC 414

Physics

1. PHYS 110, 115, 120, 151 and 152 and 175, 153 and 170, 252
2. PHYS 152, 156
3. PHYS 156, 203, 213, GEOP 221
4. PHYS 200, 250
5. PHYS 206, 216
6. PHYS 209, 215
7. PHYS 251, 301, 311
8. PHYS 306, 456
9. PHYS 308, 458
10. PHYS 309, 319
11. PHYS 312, MATH 256, 257, 316
12. PHYS 303, 356
13. PHYS 304, 350
14. PHYS 351, 401, 411
15. PHYS 402, 452
16. PHYS 403, 455
17. PHYS 406, GEOP 320

Statistics

1. STAT 200, 203
2. STAT 205, 241, 251, 302, MATH 205, 302

Program type codes (e.g. Major (30), Honours (10)) and specialization codes and abbreviations (e.g. Aquacultural Science (111 - AQSC)) have been inserted in the following pages. This information is to assist students when registering by Telereg.

PROGRAMS OFFERED IN THE FACULTY OF SCIENCE

GENERAL SCIENCE PROGRAM

The General Science degree program recognizes five designated subject areas of the Faculty of Science. These areas are:

1. Chemistry (150 - CHEM)
2. Earth Science (Astronomy, Geography, Geology, Geophysics, Oceanography[1]) (284 - ERSC)
3. Life Science (Biochemistry, Biology, Microbiology, Oceanography[2], Pharmacology, Physiology, Psychology) (539 - LFSC)
4. Mathematical Science (Computer Science, Mathematics, Statistics) (571 - MASC)
5. Physics (790 - PHYS)

[1]*Oceanography 308, 405, 407, 408, 409, 413, 416*
[2]*Oceanography 309, 316, 406, 410, 415*

In the first year the student must complete Chemistry 110 or 120, English 100, Mathematics 100 and 101 (or 120 and 121), Physics 110 or 115 or 120 and 3 units of Electives, which may be in Arts or an introductory course in Science (other than Chemistry, Mathematics and Physics).

To satisfy the requirement of at least 15 units of Science courses numbered 300 and above, the student may select one of two routes within the General Science degree program:

Route (a) At least 9 units numbered 300 or higher must be selected from each of two of the five subject areas specified above.

Route (b) Of courses numbered 300 or higher, at least 9 units must be in one of the above subject areas, at least 3 units in a different area and at least 3 units in an area different from these two.

Courses selected must be acceptable for Major or Honours programs in the specific areas of concentration.

Students in Second Year must register in the courses which are prerequisite to the Third Year courses of their proposed areas of concentration. They must also ensure that in First and Second Years their program includes a total of 3 units of introductory Science courses other than Chemistry, Mathematics and Physics.

Students who successfully complete the B.Sc. General Science degree program will have recorded on their transcript the area or areas of concentration.

AQUACULTURAL SCIENCE
(111 - AQSC)

Several Faculties cooperate to offer a program of study leading to a B.Sc. Major degree in Aquacultural Science. This program involves study of the basic biology of organisms, and relevant aspects of applied aquatic biology, physical oceanography, bio-resource engineering and food science. For additional program information, please consult the Heads of the Departments of Animal Science or Zoology.

Certain courses in Marine Science are offered by the Western Canadian Universities (Bamfield) Marine Station on Vancouver Island. Up to 6 units of their courses may be taken there in the spring or summer period preceding registration for the Fourth Year. For details, please consult the Departments of Botany and Zoology.

Requirements for the B.Sc. degree:

Major (30)

First Year		Second Year	
Biology 101, 102 or 103	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Biology 204, 205	(3)
Mathematics 100, 101 (120, 121)	(3)	Biology 209	(1½)
Physics 110, 115 or 120	(3)	Chemistry 230	(3)
English 100	(3)	Arts elective[1]	(3)
		Elective	(1½)
	(15)		(15)

Third and Fourth Year

Microbiology 200	(3)
Biology 300	(1½)
Biology 302	(1½)
Biology 334, 335	(3)
Marine Science 450	(1½)
Three units from Bio-resource Engineering 306, Food Science 301, Animal Science 480	(3)
Oceanography 308	(1½)
One of Biology 350, 351 and 352, 353, Biology 451/Oceanography 415 or equivalent	(1½-3)
One of Marine Science 454, 460 or 470	(1½)
Program electives[2]	(4½-6)
Elective	(3)
Arts elective	(3)
	(30)

[1]ECON 100 recommended

[2]Program Electives

AGEC 258, ANSC 480, ANSC 481, ANSC 482, BIOE 306, BIOE 485, BIOL 320, BIOL 326, BIOL 405, BIOL 408, BIOL 426, BIOL 428, BIOL 429, FOOD 301, FOOD 308, MRNE 401, MRNE 402, MRNE 410, MRNE 411, MRNE 412, MRNE 413, MRNE 420, MRNE 430, MRNE 435, OCGY 316/BIOL 305 or OCGY 309, OCGY 406/BIOL 403, OCGY 412, OCGY 413, PCTH 305

A maximum of three units of directed studies may be selected from the following, with permission of the appropriate Head of the Department: AGEC 430, ANSC 430, BIOE 498, BIOL 448, FOOD 430, MICB 448, MRNE 400, OCGY 448.

ASTRONOMY
(115 - ASTR)

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 (30)

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)	Mathematics 200, 221, 315	(4½)
Physics 120 or 115, or 110	(3)	Physics 200, 203, 209	(4½)
English 100	(3)	Elective[2]	(3)
Arts Elective[1]	(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 111 (1½), 114 and 116 (3), or 118 (1½).

Honours (10) Astronomy and Geophysics — Focus Planetary Sciences (365 - GEPA)

First Year		Second Year	
Chemistry 110 or 120	(3)	Chemistry 208	(3)
Mathematics 100, 101 (120, 121)	(3)	Computer Science 111 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)

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	(5½-3½)
		Option G[3]	
		Geophysics 420, 421	(3)
		Geophysics 449	(1-3)
		Science electives	(5-3)
	(17½-18)		(17-16½)

[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

ATMOSPHERIC SCIENCE
(116 - ATSC)

A program of undergraduate studies and a diploma program in meteorology are offered cooperatively by the Departments of Geography and Oceanography. Students should direct enquiries to the Chairman, Atmospheric Science Program, University of British Columbia. Students wishing to undertake Graduate Studies in the Atmospheric Sciences should consult the department most appropriate to the proposed field of specialization.

Requirements for the B.Sc. Degree:

Major (30)

First Year		Second Year	
Mathematics 100, 101	(3)	Atmospheric Science/ Geography 200, 300	(3)
Physics 110 or 115 or 120	(3)	Mathematics 200, 221	(3)
Chemistry 110 or 120	(3)	Physics 213, 215, 216	(6)
English 100	(3)	Computer Science 111	(1½)
Arts Elective	(3)	Arts Elective	(1½)
	(15)		(15)

Third Year		Fourth Year	
Atmospheric Science/ Geography 301, 302, 303	(4½)	At least 4½ units from Atmospheric Science 440, 441, 442	
Atmospheric Science Electives[1]	(1½)	Atmospheric Science/ Oceanography 411, 414	(4½)
Mathematics 315	(1½)	Atmospheric Science Electives[1]	(6)
Statistics 200	(1½)	Electives[2]	(4½)
Physics 312 or Mathematics 316	(1½)		
Arts Elective	(1½)		
Electives[2]	(3)		
	(15)		(15)

[1]Chosen from: Chemistry 302 (recommended prerequisite: Chemistry 201); Geography 205, 401, 402, 403; Oceanography 308, 401; Physics 421; Soil Science 414.

[2]Students intending to seek Federal employment as a meteorologist are urged to

add Mathematics 201 as an elective in their third or fourth year and a further 1½ units of Physics on topics such as fluid mechanics, optics, applied physics, advanced mechanics. These students must include Atmospheric Science/Oceanography 411, 414 and 2 of Atmospheric Science 440, 441, 442 in their program.

Honours[1] (10)

First Year		Second Year	
As for B.Sc. Major	(15)	As for B.Sc. Major	(15)
Third Year		**Fourth Year**	
Atmospheric Science/ Geography 301, 302, 303	(4½)	Atmospheric Science 440, 441, 442	(4½)
Atmospheric Science Elective[2]	(3)	Atmospheric Science 449	(3)
Mathematics 201, 315	(3)	Atmospheric Science/ Oceanography 411, 414	(3)
Statistics 200	(1½)	Atmospheric Science Electives[2]	(4½)
Physics 312 or Mathematics 316	(1½)	Electives[3]	(3)
Chemistry 201, 302	(3)		
Arts Elective	(1½)		
	(18)		(18)

[1]Entry into the program requires a 70 per cent average in the previous full year. Continuation in the program requires a 65 per cent cumulative average for all courses taken in the program.

[2]Chosen from Geography 205, 401, 402, 403; Oceanography 308, 401; Physics 421; Soil Science 414.

[3]Students intending to seek Federal employment as a meteorologist are urged to add a further 1½ units of physics. See footnote 2, B.Sc. Major program.

DIPLOMA IN METEOROLOGY

The Diploma in Meteorology offers an intensive one-year program in theoretical and applied Meteorology. It is designed for students with little or no background in Meteorology who wish to direct their experience to environmental applications or to gain employment as a meteorologist.

Admission is based on an acceptable academic record (usually a bachelor's degree in physics, applied mathematics, engineering or similar disciplines). Typically this should include about 13½ units of mathematics (up to introduction to partial differential equations) and computer science (including some numerical analysis), and 10½ units of physics.

The diploma program requires a minimum of 15 units of coursework in atmospheric science. Each student will plan an individual program in consultation with the Chairman of the Atmospheric Science program. For those with sufficient mathematics and physics but no meteorology a typical program would include: Atmospheric Science 440, 441, 442, Atmospheric Science/Geography 301, 302, 303, and Atmospheric Science/Oceanography 411 and 414, plus 3 units from Chemistry 302, Geography 401, 402, 403, Mechanical Engineering 482, Oceanography 308, 401, Physics 421, Soil Science 414. An exemption of up to 6 units of credit for courses already taken will be allowed. Students granted exemptions will be required to add electives of appropriate undergraduate or graduate courses. Additional courses may be added or substituted by the Chairman to make up the mathematics or physics background of the student. The total load is not to exceed 18 units.

Financial aid is available to entering non-UBC students from the Natural Sciences and Engineering Research Council/Atmospheric Environmental Service Studentship Program on a competitive basis.

BIOCHEMISTRY
(120 - BIOC)

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) amd 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 (30)

First Year		Second Year	
Biology 101 or 102 or 103	(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)
	(15)	Elective[1]	(1½)
			(15)
Third Year		**Fourth Year**	
Biochemistry 303	(3)	Biochemistry 402, 403	(3)
Biochemistry 301	(1½)	Physiology 301	(3)
Biology 334	(1½)	Arts elective	(3)
Chemistry 305	(3)	Electives chosen in consultation with the Department[1]	(6)
Chemistry 313	(3)		
Arts elective	(3)		
	(15)		(15)

Honours (10)

First Year		Second Year	
Biology 101 or 102 or 103	(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)
	(15)	Science elective[1]	(1½)
			(18)
Third Year		**Fourth Year**	
Biochemistry 303	(3)	Biochemistry 402, 403	(3)
Biochemistry 301	(1½)	Biochemistry 404	(1½)
Chemistry 313	(3)	Biochemistry 420	(1½)
Chemistry 305	(3)	Biochemistry 421 or 449	(1½)
Biology 334	(1½)	Science electives[1]	(5½)
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 (30)

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 AND 305[2]	(6)	Biochemistry 410	(1½)
Biology 334	(1½)	Microbiology 302 or 408 or 409	(1½)
Biology 335	(1½)	Arts Elective	(6)
Science Elective[1]	(1½)	Electives[1]	(3)
	(15)		(15)

Honours (10)

First and Second Year

as in Option A

Third Year		Fourth Year	
Biochemistry 301	(1½)	Biochemistry 402, 403	(3)
Biochemistry 303	(3)	Biochemistry 404	(1½)
Chemistry 305	(3)	Biochemistry 410	(1½)
Chemistry 313	(3)	Biochemistry 420	(1½)
Biology 334	(1½)	Biochemistry 421	(1½)
Biology 335	(1½)	Microbiology 302 or 408 or 409	(1½)
Arts Elective	(3)	Science Electives[1]	(6)
	(16½)		(16½)

[1]Suggested Science electives (Major and Honours):

Second, Third or Fourth Year

Computer Science 114 and 116 or 118	(1½-3)	Mathematics/Statistics 205	(1½)
		Biology 204	(1½)

Third or Fourth Year

Biochemistry 410[4]	(1½)	Biology 433[3]	(1½)	Microbiology 302	(1½)
Biochemistry 448	(1½)	Biology 439	(3)	Microbiology 324	(1½)
Biochemistry 449[2]	(1½/3)	Biology 450	(1½)	Microbiology 402	(1½)
Biology 300	(1½)	Biology 453	(1½)	Microbiology 408[4]	(1½)
Biology 301	(1½)	Chemistry 335	(3)	Microbiology 409[3]	(1½)
Biology 331	(1½)	Chemistry 405	(1)	Med Genetics 410[3]	(1½)
Biology 335[4]	(1½)	Chemistry 411	(1½)	Med Genetics 420[3]	(1½)
Biology 350	(3)	Chemistry 413	(1)	Med Genetics 421[3]	(1½)
Biology 431[3]	(3)	Chemistry 435	(1)	Physiology 301	(3)
Biology 432[3]	(1½)				

[2]In option B, either Chemistry 313 or 305 can be postponed until the Fourth Year, and three units of Arts substituted in the Third Year.
[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 (10)
(120 - BIOC, 150 - CHEM)

First Year		Second Year[1]	
Biology 101 or 102 or 103	(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	(1½)
Chemistry 313	(3)	Chemistry 335 (or 310)	(3)
Chemistry 305 (or 304)	(3)	Chemistry Electives[2]	(4)
Chemistry 311	(2)	Science Electives[3]	(3)
Arts Elective	(3)	Chemistry 449 or Biochemistry 420 and 449	(3)
Biology 334	(1½)		
	(17)		(17½)

[1]Students intending to take Chenistry 312 should take Mathematics 221 in Second Year.
[2]To be chosen from Chemistry 312 and 400 level Chemistry lecture courses (Chemistry 405, 406, 411, 413, 435 recommended).
[3]Recommended Science electives: Biology 300, 335; Mathematics 221; Microbiology 302; Physiology 301 or Biology 353.

BIOLOGY

The Departments of Botany and Zoology jointly offer only one undergraduate degree, that is a degree in Biology. The two departments separately offer opportunities for study leading to master's and doctoral degrees. For information on these see the Faculty of Graduate Studies section of the calendar. Students wishing to undertake a graduate program in Biology at U.B.C. should contact the Life Science departments most appropriate to the field of specialization.

There are seven undergraduate degree options leading to a Major or Honours B.Sc. in Biology. Students should consult advisors in the Departments of Botany and Zoology on the selection of these options.

Certain courses in Marine Science are offered by the Western Canadian Universities Marine Biological Society at the Bamfield Marine Station on Vancouver Island. 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 the Departments of Botany and Zoology.

Note: Biology 101 or 102 or 103 (or equivalent) is prerequisite to all Biology courses, except Biology 153, 343, 344, 345, 346 and 446.

Primarily for First Year Students

Biology 101, Biology 102, or Biology 103 is a prerequisite for admission to Major or Honours programs in the Life Sciences Departments. Any one of these courses will meet the First Year Biology requirements 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 each of these three introductory courses, BIOL 101, BIOL 102 and BIOL 103, is accepted as a prerequisite to further courses in Biology, credit may be obtained for only one. However, the course selected is determined by the level of biology completed in high school as noted under course description.

Requirements for the B.Sc. degree:

First Year Major and Honours — All Options

ENGL 100	(3)
MATH 100, 101	(3)
PHYS 110, 115, or 120	(3)
CHEM 110 or 120	(3)
BIOL 101, 102, or 103	(3)
	(15)

Animal Biology (122 - BIAN)

Second Year Major (30) and Honours (10)

BIOL 200, 201	(3)
BIOL 204, 205	(3)
CHEM 230	(3)
Arts Elective	(3)
Elective*	(3)
	(15)

*BIOL 209, 210 recommended

Third and Fourth Year Major (30)

BIOL 300	(1½)
BIOL 302, 303	(3)
BIOL 334, 335	(3)
BIOL 353	(3)
Arts Elective	(3)
Animal Biology Electives	(7½)
Electives	(9)
	(30)

Third and Fourth Year Honours (10)

As above, with the addition of BIOL 331, BIOL 447, and BIOL 449 to total 36 units in third and fourth years. BIOL 347 strongly recommended.

ANIMAL BIOLOGY ELECTIVES

BIOC 302 (1½)	BIOL 332 (3)	BIOL 426 (3)
BIOC 402 (1½)	BIOL 333 (1½)	BIOL 427 (3)
BIOL 301 (1½)	BIOL 350 (3)	BIOL 439 (3)
BIOL 305 (1½)	BIOL 354 (1½)	BIOL 441 (1½)
BIOL 310 (1½)	BIOL 405 (1½)	BIOL 446 (1½)
BIOL 325 (1½)	BIOL 410 (1½)	BIOL 450 (1½)
BIOL 326 (1½)	BIOL 411 (1½)	BIOL 453 (1½/3)
BIOL 327 (1½)	BIOL 413 (1½)	BIOL 454 (1½)
BIOL 328 (3)	BIOL 414 (1½)	BIOL 455 (1½)
BIOL 331 (1½)	BIOL 425 (1½)	BIOL 456 (1½)

Cell and Developmental Biology (123 - BICD)

Second Year Major (30) and Honours (10)

BIOL 200, 201	(3)
3 units from BIOL 204, 205, 209, 210 or MICB 200	(3)
CHEM 230	(3)
Arts Elective	(3)
Elective*	(3)
	(15)

*CHEM 205 recommended

Third and Fourth Year Major (30)

BIOL 300	(1½)
BIOL 302 or 303	(1½)
BIOL 331 or 352	(1½)
BIOL 334, 335	(3)
BIOL 350	(3)
BIOC 302 or 303	(1½ or 3)
Arts Elective	(3)
Cell and Development Electives	(7½)
Electives	(7½ or 6)
	(30)

Third and Fourth Year Honours (10)

As above, with the addition of BIOL 447, BIOL 449 and BIOC 303 to total 36 units in third and fourth years. BIOL 347 strongly recommended.

CELL AND DEVELOPMENT ELECTIVES

ANAT 405 (1½)	BIOL 351 (1½)	BIOL 437 (1½)
BIOC 402 (1½)	BIOL 352 (1½)	BIOL 450 (1½)
BIOC 403 (1½)	BIOL 353 (3)	BIOL 452 (1½)
BIOC 410* (1½)	BIOL 430 (1½)	BIOL 455 (1½)
BIOC 421 (1½)	BIOL 431 (3)	MICB 302 (1½)
BIOL 330 (1½)	BIOL 432 (1½)	MICB 402 (1½)
BIOL 331 (1½)	BIOL 433 (1½)	MICB 408 (1½)
BIOL 332 (3)	BIOL 435 (1½)	MICB 409 (1½)
BIOL 337 (1½)	BIOL 436 (1½)	MRNE 411 (3)

*BIOC 303 Prerequisite

Ecology (124 - BIEC)

Second Year Major (30) and Honours (10)

BIOL 200, 201	(3)
One of BIOL 204, 205	(1½)
One of BIOL 209, 210	(1½)
CHEM 230	(3)
Arts Elective	(3)
Elective*	(3)
	(15)

*Courses remaining from BIOL 204, 205 and BIOL 209, 210 strongly recommended.

Third and Fourth Year Major (30)

BIOL 300	(1½)
BIOL 302, 303	(3)
BIOL 334, 335	(3)
BIOL 351, 352 or BIOL 353	(3)
Arts Elective	(3)
Ecology Electives	(9)
Electives	(7½)
	(30)

Third and Fourth Year Honours (10)

As above, with the addition of BIOL 414, BIOL 447 AND BIOL 449 to total 36 units in third and fourth years. BIOL 347 strongly recommended.

ECOLOGY ELECTIVES

BIOL 301 (1½)	BIOL 332 (3)	BIOL 410 (1½)
BIOL 305 (1½)	BIOL 400 (1½)	BIOL 411 (1½)
BIOL 310 (1½)	BIOL 401 (1½)	BIOL 412 (1½)
BIOL 320 (1½)	BIOL 402 (1½)	BIOL 413 (1½)
BIOL 321 (1½)	BIOL 403 (1½)	BIOL 414 (1½)
BIOL 322 (1½)	BIOL 404 (3)	BIOL 415 (1½)
BIOL 323 (1½)	BIOL 405 (1½)	BIOL 426 (3)
BIOL 324 (1½)	BIOL 406 (1½)	BIOL 427 (3)
BIOL 326 (1½)	BIOL 407 (1½)	BIOL 439 (3)
BIOL 327 (1½)	BIOL 408 (3)	MRNE 430 (3)
	BIOL 409 (1½)	MRNE 435 (3)

General Biology (126 - BIGN)

Second Year Major (30) and Honours (10)

BIOL 200/201	(3)
6 units from BIOL 204, 205, 209, 210, and MICB 200	(6)
CHEM 230	(3)
Arts Elective	(3)
	(15)

Third and Fourth Year Major (30)

The remaining 3 units from BIOL 204, 205, 209, 210, or MICB 200	(3)
BIOL 300	(1½)
BIOL 302, 303	(3)
BIOL 334, 335	(3)
BIOL 350 or BIOL 351, 352 or BIOL 353	(3)
Arts Elective	(3)
Biology Courses numbered 300 or above	(4½)
Electives	(9)
	(30)

Third and Fourth Year Honours (10)

As above, with the addition of BIOL 447, BIOL 449, and 1½ units of electives numbered 300 or above. BIOL 347 strongly recommended.

Genetics (127 - BIGT)

Second Year Major (30) and Honours (10)

BIOL 200, 201	(3)
3 units from BIOL 204, 205, 209 and 210	(3)
CHEM 230	(3)
Arts Elective	(3)
MICB 200	(3)
	(15)

Third and Fourth Year Major (30)

BIOL 300	(1½)
BIOL 302 or 303	(1½)
BIOL 334, 335	(3)
BIOL 350, or 351, 352, or 353	(3)
BIOC 303	(3)
Arts Elective	(3)
Genetics Electives	(9)
Electives	(6)
	(30)

Third and Fourth Year Honours (10)

As above, with the addition of BIOL 447, BIOL 449 and 1½ units of genetics electives to total 36 units in third and fourth years. BIOL 347 strongly recommended.

GENETICS ELECTIVES

Students must select 9 units of electives from the courses listed below, of which 4½ units must be from Biology courses.

BIOC 402 (1½)	BIOL 431 (3)	MEDG 410 (1½)
BIOC 403 (1½)	BIOL 432 (1½)	MEDG 419 (1½)
BIOC 410 (1½)	BIOL 433 (1½)	MICB 302 (1½)
BIOC 421 (1½)	BIOL 434 (1½)	MICB 408 (1½)
BIOL 331 (1½)	BIOL 436 (1½)	MICB 409 (1½)
BIOL 337 (1½)	BIOL 452 (1½)	

Marine Biology (128 - BIMR)

Second Year Major (30) and Honours (10)

BIOL 200, 201	(3)
BIOL 205, 209	(3)
CHEM 230	(3)
Arts Electives	(3)
Electives*	(3)
	(15)

*BIOL 204 and 210 strongly recommended

Third and Fourth Year Major (30)

BIOL 300	(1½)
BIOL 302, 303	(3)
BIOL 320	(1½)
BIOL 326	(1½)
BIOL 334, 335	(3)
BIOL 350, or 351, 352, or 353	(3)
Arts Elective	(3)
Marine Biology Electives	(7½)
Electives	(6)
	(30)

Third and Fourth Year Honours (10)

As above, with the addition of BIOL 447, BIOL 449 and a Marine Science elective at a marine station, to total 36 units in third and fourth years. BIOL 347 strongly recommended.

MARINE BIOLOGY ELECTIVES

BIOL 301 (1½)	BIOL 426 (3)	MRNE 440 (3)
BIOL 305 (1½)	BIOL 428 (1½)	MRNE 445 (3)
BIOL 325 (1½)	BIOL 429 (1½)	MRNE 450 (1½)
BIOL 331 (1½)	BIOL 451 (1½)	MRNE 454 (1½)
BIOL 332 (3)	MRNE 410 (3)	MRNE 460 (1½)
BIOL 402 (1½)	MRNE 411 (3)	MRNE 470 (1½)
BIOL 403 (1½)	MRNE 412 (3)	OCGY 308 (1½)
BIOL 405 (1½)	MRNE 413 (3)	OCGY 405 (1½)
BIOL 408 (3)	MRNE 420 (3)	OCGY 407 (1½)
BIOL 413 (1½)	MRNE 430 (3)	OCGY 410 (1½)
	MRNE 435 (3)	

Plant Biology (129 - BIPL)

Second Year Major (30) and Honours (10)

BIOL 200, 201	(3)
BIOL 209, 210	(3)
CHEM 230	(3)
Arts Elective	(3)
Elective*	(3)
	(15)

*BIOL 204, 205 recommended

Third and Fourth Year Major (30)

BIOL 300*	(1½)
BIOL 302, 303	(3)
BIOL 324	(1½)
BIOL 334, 335	(3)
BIOL 351, 352	(3)
BIOL 415	(1½)
Arts Elective	(3)
Plant Biology Electives	(4½ or 6)
Electives	(9 or 7½)
	(30)

*An equivalent statistics course may be taken with permission of the Head of Botany.

Third and Fourth Year Honours (10)

As above, with the addition of BIOL 447, BIOL 449 and 1½ units of Plant Biology electives to total 36 units in third and fourth years. BIOL 347 strongly recommended.

PLANT BIOLOGY ELECTIVES

Major and Honours students in Plant Biology Option must include three units from:

BIOL 320 (1½)	BIOL 322 (1½)
BIOL 321 (1½)	BIOL 323 (1½)

and one of:

BIOL 420 (1½)	BIOL 439 (3)
BIOL 433 (1½)	BIOL 452 (1½)

Recommended electives:

BIOL 320, 321, 322, 323, 343, 406, 407, 412, 420, 421, 422, 424, 433, 439, 448, 451, 452.

Students are encouraged to undertake 1½ or 3 units of Directed Studies (BIOL 448) with the permission of the Instructor and approval of the Head of Botany.

Combined Biology and Chemistry Honours (10)
(130 - BIOL, 150 - CHEM)

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, 335	(3)	Biochemistry 303	(3)
Biology 350	(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]	(1½)
Arts elective	(3)	Biology or Chemistry 449	(3)
	(18)		(16½)

[1]Organismal: Three units from: Biology 204, 205, 209, 210, 324 and 332.
[2]To be chosen from 400-level Chemistry lecture courses.
[3]Biology 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
(140 - BOTA)

The Department of Botany offers programs of study jointly with the Department of Zoology leading to the bachelor's degree (B.Sc.) in Biology. One of the options or areas of concentration in this degree program is the Option in Plant Biology (see above). This replaces the B.Sc. degree in Botany.

The Department of Botany offers programs leading to the master's and doctoral degrees in a wide range of contemporary plant studies, including phytogeography, ecology (including ecophysiology), ethnobotany, systematics (including chemotaxonomy), morphology and plant development, cytology, membrane biochemistry and physiology, chemical ecology, and molecular genetics. For further information on the M.Sc. and Ph.D. degree programs consult the Faculty of Graduate Studies section of the Calendar and the Department of Botany's Graduate Brochure, available in the Botany Office.

CHEMISTRY
(150 - CHEM)

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 (30)

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	(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 (10)

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 (10)
(150 - CHEM, 570 - MATH)

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 226, 227, (200, 201)	(3)
Elective[1]	(3)	Physics 206	(1½)
		Science elective	(1½)
		Arts elective	(3)
	(15)		(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)
		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

Chemical Engineering — Chemistry Honours

Chemical Engineering — Chemistry Honours is a program jointly administered by the Department of Chemical Engineering and Chemistry. Enquiries regarding the program and student advising should be made to the Faculty advisers in either Department.

The completion of the B.A.Sc. degree in Chemical Engineering — Chemistry Honours will normally take five years of university study. Entry to the program is normally from First Year Applied Science. To obtain permission to enter the program students must consult the Faculty advisers in the Departments of Chemical Engineering and Chemistry. Details of the program are given in the Applied Science section of this Calendar.

To satisfactorily complete the program, students must obtain a minimum overall second-class average in their chemistry courses numbered 300 and higher.

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., 4th 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
(200 - CPSC)

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.

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 Cooperative 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.

Requirements for the B.Sc. degree:

Major and Honours

First Year	
Computer Science 124, 126[1]	(3)
Mathematics 100, 101 (120, 121)	(3)
Physics 110, 115 or 120	(3)
Chemistry 110 or 120	(3)
English 100	(3)
	(15)

[1]Special arrangements may be made for a student who did not take Computer Science 124 and 126 in First Year; however, such arrangements may limit choice of 400-level courses.

Enrolment in Computer Science courses numbered above 200 is controlled by stringent academic admissions criteria. Students should consult the Computer Science Department during the spring or summer to determine the criteria for admission.

Major (30)

Second Year		Third and Fourth Years	
Computer Science 210, 213, 220	(4½)	Computer Science 310, 319	(3)
Mathematics 200, 221	(3)	Computer Science 320	(1½)
Statistics 241[2]	(1½)	Other Computer Science courses numbered 300 or above[3]	(6)
Arts elective	(3)	Further Computer Science courses numbered 400 or above	(6)
Elective	(3)	Mathematics courses numbered 300 or above[4]	(4½)
		Arts elective	(3)
		Electives[5]	(6)
	(15)		(30)

[2]Can be replaced by STAT 200 plus MATH/STAT 302.
[3]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, 303, 402, 403, 404, 405, 406).
[4]Mathematics courses in analysis, applied mathematics, linear algebra, probability and differential equations and Statistics are recommended. Such courses include Mathematics 300, 303, 307, 315, 316, 340, 341, 342, 345, 400, 407 and 426, MATH/STAT 302 and Statistics 304, 305, 306, 405 and 406.
[5]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 337, 410, 411, 456, 457, 458; Electrical Engineering 256, 359, 360, 455 and 464.

Honours (10)

Second Year		Third and Fourth Years	
Computer Science 210, 213	(3)	Computer Science 302, 303 310, 319, 320	(7½)
Computer Science 220	(1½)	Computer Science 421	(1½)
Mathematics 200, 220, 221	(4½)	Other Computer Science courses numbered 300 or above[3]	(10½)
Statistics 241[2]	(1½)	Mathematics courses numbered 300 or above[4]	(9)
Arts elective	(3)	Arts elective	(3)
Elective	(3)	Elective[5]	(3)
	(16½)		(34½)

[2]Can be replaced by Statistics 200 plus MATH/STAT 302.
[3]Computer Science 448 is recommended.
[4]Mathematics courses in analysis, applied mathematics, linear algebra, probability, and differential equations and Statistics courses are recommended.
[5]Courses in logic, foundations of mathematics, and Electrical Engineering 256 are strongly recommended.

Major (30) in the Mathematical Sciences
(offered with Departments of Mathematics and Statistics)
(571 - MASC)

First Year		Second Year	
Computer Science 124, 126[1]	(3)	Mathematics 200, 220, 221	(4½)
Mathematics 100, 101 (120, 121)	(3)	Computer Science 210, 213, 220	(4½)
Physics 110, 115 or 120	(3)	Mathematics/Statistics 302	(1½)
Chemistry 110 or 120	(3)	Statistics 200	(1½)
English 100	(3)	Arts Elective	(3)
	(15)		(15)

Third and Fourth Years	
Mathematics 303[2], 307, 315, 340	(6)
Computer Science 302, 303, 310, 319, 320	(7½)
Statistics 305, 306, 404	(4½)
Arts Elective	(3)
Electives[3]	(9)
	(30)

[1]Special arrangements may be made for a student who did not take Computer Science 124 and 126 in First Year; such arrangements may limit choice of 400-level courses.
[2]Mathematics 418 may be substituted.
[3]These electives must include at least 6 units selected from the following courses: Computer Science 304, 313, 402, 403, 405, 406, 414, 417, 421; Mathematics 201, 300, 314, 316, 320-323, 341, 342, 400, 407, 413, 418; Statistics 304, 344, 346, 405, 406, 441, 445, 447.

Combined Honours (10) in Computer Science and Mathematics
(200 - CPSC, 570 - MATH)

First Year		Second Year	
English 100	(3)	Computer Science 210, 213, 220	(4½)
Mathematics 120, 121 (100, 101)	(3)	Mathematics 223[2], 224[2], 226, 227	(6)
Chemistry 110 or 120	(3)	Arts elective	(3)
Physics 110, 115 or 120	(3)	Elective	(3)
Computer Science 124 and 126[1]	(3)		(16½)
	(15)		

Third Year		Fourth Year	
Computer Science 302[3], 303[3], 310, 319, 320	(7½)	Computer Science 421	(1½)
Computer Science course numbered 300 or above	(1½)	Computer Science courses numbered 300 and above	(3)
Mathematics 320, 323[4]	(6)	Six units from Mathematics 400, 418, 420, 422-428,	
One of Mathematics 300 or 322	(3)	Computer Science 402, 403	(6)
		Arts elective	(3)
		Elective	(3)
	(18)		(16½)

[1]Special arrangements may be made for a student who did not take Computer Science 124 and 126 in First Year. Such arrangements may limit choice of 400-level courses.
[2]May be replaced by Mathematics 221, 307, respectively.
[3]May be deferred to the following year.
[4]May be replaced by Mathematics 315, 316.

Combined Honours (10) in Computer Science and Physics
(200 - CPSC, 790 - PHYS)

First Year		Second Year	
As for Honours Physics, but in lieu of the "Arts Elective" Computer Science 124 and 126 (3)		Physics 200, 206	(3)
		Physics 203, 209	(3)
		Mathematics 200, 221, 315	(4½)
		Computer Science 210, 213	(3)
		Elective[1,2]	(3)
			(16½)

Third Year		Fourth Year	
Physics 301, 304	(3)	Physics 307	(1)
Physics 303, 306	(3)	Physics 308, 402	(3)
Physics 309	(2)	Physics 449	(3)
Computer Science 302, 303	(3)	Computer Science 402 or 403	(1½)
Computer Science 220	(1½)	Additional Computer Science (per consultation)	(6)
Computer Science 310, 319	(3)	Arts Elective	(3)
Mathematics 316	(1½)		(17½)
	(17)		

[1]It is recommended that Mathematics 201 be taken in the second term of the second year.
[2]A total of 9 units of Arts (including English 100) is required.

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 a Combined Honours program must 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.

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, 471, 472, 473.

Major (30) in Physical Geography (755 - PGEO)

First Year		Second Year	
English 100	(3)	Geography 200, 205 and 207	(4½)
Mathematics 100, 101 (120, 121)	(3)	Geography 220 or 260	(1½)
Physics 110 or 115 or 120	(3)	Statistics 200, Mathematics 200	(3)
Chemistry 110 or 120	(3)	Computer Science 111	(1½)
Geography 101[1]	(3)	Geophysics 221 or Chemistry 208	(3)
		Arts elective	(1½)
	(15)		(15)

Third Year		Fourth Year	
Geography 300, 306, 310	(4½)	Two of Geography 308, 405, 406, Geology 342, 442	(3)
Geography 372, 373[2]	(1½)	Two of Geography 303, 401 402, 403, Atmospheric Science 440	(3)
Geography 309[3]	(1½)	Oceanography 308	(1½)
Two of Geography 315, 317, 415, 417, 418	(3)	Electives[5]	(7½)
Soil Science 200 or Geology 256 or Biology 302	(1½)		
Arts elective[4]	(3)		
	(15)		(15)

[1]Special arrangements may be made for students unable to take this course in first year.
[2]Students enrolled in this program are excused from the listed prerequisite for this course.
[3]Field Course taken in May of the Third Year.
[4]English 301 recommended.
[5]At least three units must be upper level Science.

Honours (10) — Climatology[1] (173 - CLIM)

First Year		Second Year	
English 100	(3)	Atmospheric Science/ Geography 200, 300	(3)
Mathematics 100, 101 (120, 121)	(3)	Geography 205	(1½)
Physics 110 or 115 or 120	(3)	Mathematics 200, 221	(3)
Chemistry 110 or 120	(3)	Geophysics 221	(3)
Geography 101[2]	(3)	Computer Science 111	(1½)
		Arts Elective[3]	(3)
	(15)		(15)

Third Year		Fourth Year	
Atmospheric Science/Geography 301, 302, 303	(4½)	Geography 449	(1½)
Geography 309[4], 310	(3)	Two of Geography 401, 402, 403	(3)
Oceanography 308	(1½)	Geography 472, 473	(3)
Mathematics 315 and Physics 312	(3)	Three of Oceanography 401, Soil Science 414, Chemistry 302[5], Atmospheric Science 411, 414, 442	(4½)
Mathematics 201 or Physics 329 or Geophysics 322	(1½)	Atmospheric Science 440	(1½)
Statistics 200	(1½)	Arts Elective[3]	(1½)
Arts Elective[3]	(1½)	Elective	(3)
Elective	(1½)		
	(18)		(18)

[1]Entry into the program requires a 70 percent average mark in the previous full year. Continuation in the program requires a 65 percent cumulative average.
[2]Special arrangements can be made for students who have been unable to take this course in first year.
[3]English 301 recommended.
[4]Field Course taken in May of the Third Year.
[5]Chemistry 201 is recommended before this course.

Honours (10) — Geomorphology[1] (394 - GMPH)

First Year		Second Year	
English 100	(3)	Geography 200, 205	(3)
Mathematics 100, 101 (120, 121)	(3)	Geology 200, 201 and 256	(4½)
Physics 110 or 115 or 120	(3)	Mathematics 200, 221	(3)
Chemistry 110 or 120	(3)	Geophysics 221	(3)
Geography 101 or Geology 105 or Geophysics 120 and Geology 125	(3)	Computer Science 111	(1½)
		Statistics 200	(1½)
	(15)		(16½)

Third Year		Fourth Year	
Geography 306, 308	(3)	Geography 405[2] or 406[2]	(1½)
Geography 405[2] or 406[2]	(1½)	Geology 342	(1½)
Geology 302, 354	(3)	Mathematics 316 or Physics 312	(1½)
Geography 373[3] or Geology 305	(1½)	Geography 449 or Geology 449	(3)
Geography 309[4] or Geology 335[4]	(1½)	Electives[5]	(4½)
Mathematics 201, 315	(3)	Arts Electives	(3)
Geology 405	(1½)	Electives	(1½)
Arts Elective	(3)		
	(18)		(16½)

[1]Entry into this program requires a 70 percent average mark in the previous full year. Continuation in the program requires a 65 percent cumulative average.
[2]Given in alternate years.
[3]Students enrolled in this program are excused from the listed prerequisite for this course.
[4]Field Course given in May of Third Year. Note: Geology 335 requires Geology 235 as a prerequisite.
[5]From approved courses numbered 300 and above in Geography, Geological Sciences, Geophysics or Oceanography.

GEOLOGICAL SCIENCES
(370 - GEOL)

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.

Geology 105 or 125 (or 150) is normally prerequisite for all other courses in geology. 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.

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 (30)

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 200	(1½)
English 100	(3)	Mathematics 200 or 221 or Computer Science 111 or 114	(1½)
		Chemistry 208	(3)
		Biology 101 or 102 or Geophysics 221	(3)
	(15)		(15)

Third Year		Fourth Year	
Geology 302, 303	(3)	Geology 309	(1½)
Geology 304	(3)	Geology 415 or 425	(1½)
Geology 305, 321	(3)	Earth Science Electives[2]	(3)
Geology 335[1]	(1½)	Electives	(6)
Geology 351	(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 (10)

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 200	(1½)
English 100	(3)	Two of Mathematics 200, 221 or Computer Science 111 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)
Geology 351	(1½)		
Arts Elective	(3)		
	(18)		(16½)

[1]Field School in May after Third Year.

Combined Honours (10) Geology and Geophysics (370 - GEOL, 360 - GEOP)

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 111 or 114	(1½)
English 100	(3)	Arts Elective	(3)
	(15)		(17½)

Third Year		Fourth Year	
Geology 302, 304, 351	(6)	Geology 415 or 425	(1½)
Geophysics 320, 321 and 322	(4½)	Geophysics 420, 421, 426	(4½)
Mathematics 315, 316	(3)	Geology 449 or Geophysics 449	(3)
Physics 311, 319	(3)	Electives	(5)
		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.

Combined Geology and Oceanography Honours
See Oceanography Programs

Combined Honours (10) Geology and Another Subject (370 - GEOL)

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
(360 - GEOP)

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 (30)

First Year		Second Year	
Geophysics 120 and Geology 125[1]	(3)	Computer Science 111	(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, 319	(3)	Arts elective	(3)
Physics 312 or Mathematics 316	(1½)	Elective[2]	(3)
Elective[2]	(3)		
	(15)		(15)

[1]Geology 105 may be substituted 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.

Honours (10)

Geophysics is an interdisciplinary physical science concerned with the nature of the earth and its environment and as such seeks to apply the knowledge and techniques of physics, mathematics and chemistry to understand the structure and dynamic behaviour of the earth and its environment. The required sequence of mathematics, physics and geophysics courses is designed to provide a basic structure on which to build a coherent honours program with science electives normally selected from geophysics, geology, astronomy, oceanography, mathematics, physics and chemistry.

First Year		Second Year	
Geophysics 120 and Geology 125[1]	(3)	Computer Science 111	(1½)
Chemistry 120 (110)	(3)	Mathematics 200, 221, 315	(4½)
Mathematics 100, 101 (120, 121)	(3)	Physics 203, 209	(3)
Physics 120 (115 or 110)	(3)	Electives[2]	(9)
English 100	(3)		
	(15)		(18)

Third and Fourth Years:

Mathematics 201	(1½)
Mathematics 316 (Physics 312)	(1½)
Physics 301, 309	(3½)
Geophysics 426 or GEPA 315	(1½-3)
Geophysics 320, 321, 322	(4½)
Geophysics 449 (or equivalent)	(3)
Electives[2]	(17½-19)
	33

Notes: (1) Geology 105 may be substituted. Special arrangements may be made for students unable to complete this requirement in first year.
(2) The electives of years 2-4 must contain 6 units of Arts and 3 units of Geology. The remaining electives must form a coherent program to be approved by the departmental undergraduate committee. Sample programs in which the emphasis of the electives varies (e.g. geology, solid earth geophysics, astronomy, oceanography) are available from the department.

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

MATHEMATICS
(570 - MATH)

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.

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 large selection of courses in various areas of pure and applied mathematics and requiring various levels of mathematical sophistication. The student is advised to consult a Mathematics adviser during the second year or when considering becoming a Mathematics Major in order to design a coherent program of study suitable to the student's interests and abilities.

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). The program must be approved by an Honours adviser.
2. 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.
3. The following Mathematics courses are intended primarily for Honours students in Mathematics and other fields: Mathematics 120, 121, 220, 223, 224, 226, 227, 300, 320-323, 400, 418, 420, 422-428.
4. PHYS 206 is a strongly recommended elective. Students are encouraged to choose electives that result in studying another subject to substantial depth. Recommended courses numbered 300 or above include PHYS 301, 304, CPSC 302, STAT 406.
5. For students who plan graduate work in Mathematics, study in French, German or Russian is recommended.

Major (30)

First Year		Second Year	
Mathematics 100, 101 (120, 121)	(3)	Mathematics 200, 201 (226, 227)	(3)
Physics 120, 115 or 110	(3)	Mathematics 220[2]	(1½)
Chemistry 120 or 110	(3)	Mathematics 221, (223) 315[2]	(3)
English 100	(3)	Arts Elective	(3)
Computer Science 124, 126 (118)[1]	(1½-3)	Elective[5]	(4½)
Elective	(0-1½)		
	(15)		(15)

Third and Fourth Years

Mathematics courses numbered 300 or above[2]	(12)
Mathematics, Statistics, or Computer Science courses numbered 300 or above	(4½)
Arts Elective	(3)
Electives	(10½)
	(30)

[1]Computer Science 124, 126 is highly recommended. Computer Science may be delayed until the second year.

[2]One of MATH 220, 315 may be delayed until the third year. However, MATH 315 will not count toward fulfilling the requirements listed under the third and fourth years.

Recommendations

1. Mathematically able students are encouraged to take the honours stream MATH 120, 121, 223, 224, 226 and 227. Students completing the last four courses in this sequence are not required to take MATH 220.
2. Students interested in Computer Science courses should consider taking CPSC 210 in the second year.
3. MATH 302 and MATH 307 (or 224) are courses which are useful in many areas of mathematics and are recommended for all mathematics majors.
4. Students interested in pursuing statistics to some depth should take MATH/STAT 302 in the second year so as to complete the sequence STAT 305, 306, 404, 405, by the end of the fourth year. Students taking this sequence of Statistics courses are only required to take 10½ additional units (instead of the usual 12 units) of Mathematics courses numbered 300 or above (including MATH 302). MATH 303 and 314 (or 320) are also recommended for these students.
5. Students interested in operations research should take MATH 340, 341 and 342. They are also advised to take MATH 303, STAT 305 and 306, and some advanced Computer Science courses.
6. Students interested in teaching are advised to take MATH 310, 311 and 445.
7. Students interested in applied analysis should take MATH 300, 314 (or 320) and 316. They should also consider taking some of the following courses: MATH 345, MATH 400, CPSC 302, CPSC 303, STAT 305 and PHYS 206.
8. Students interested in combining Computer Science, Mathematics and Statistics should consider the Mathematical Sciences program offered jointly with the Computer Science Department and the Statistics Department. This program is described in the Computer Science section of the Calendar.
9. In selecting electives, students should consider pursuing an area of application of mathematics to some depth. They should also ensure that, as required by the Faculty of Science, at least 36 units of Science courses are taken and that at least 21 units of Arts and Science courses numbered 300 or above are taken.

Mathematics (570) Honours (10)

First Year		Second Year	
Mathematics 120, 121 (100, 101)	(3)	Mathematics 223, 224	(3)
Physics 120 (115 or 110)	(3)	Mathematics 226, 227 (200, 201)	(3)
Chemistry 120 (110)	(3)	Mathematics 220[2]	(1½)
English 100	(3)	Computer Science 124, 126 (118)[4]	(1½-3)
Elective[1]	(3)	Arts elective	(3)
		Electives[3]	(4½-6)
	(15)		(18)

Third and Fourth Years

Math 320, 321 or 300, 322, 323	(12)
At least 9 units chosen from Math 400, 418, 420, 422-428	(9)
At least 6 units of approved Science courses 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 124/126 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 Math 226 and in Math 223.

[3]Physics 206 is strongly recommended.

[4]Computer Science 124/126 highly recommended.

Honours (10) — Applied Mathematics Option (575 - MAAP)

First Year	Second Year	
Same as Honours Mathematics[4]	Same as Honours Mathematics except: Electives[5]	(3-4½)
		(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 area 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, 303 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, 303	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 124/126 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. Students planning to take several Statistics courses should consider taking MATH/STAT 302 in the second year.

Combined Honours (10) 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, 422-428	(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 Sciences

See Computer Science Programs.

MICROBIOLOGY
(630 - MICB)

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 (30)

First Year		Second Year	
English 100	(3)	Biology 200, 201	(3)
Biology 101, 102, or 103	(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	(7½)
Microbiology 302	(1½)	Microbiology 307, 318, 400, 402, 403, 408, 409, 418, 419, 421, 430, 448	
Microbiology 321	(3)		
Microbiology 324, 325	(3)		
Biology 334	(1½)	Electives[1]	(7½)
Arts elective	(3)		
Elective[1]	(1½)		
	(15)		(15)

Honours (10)

First Year		Second Year	
English 100	(3)	Biology 200, 201	(3)
Biology 101, 102, or 103	(3)	Chemistry 230	(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: Microbiology 307, 318, 400, 402, 403, 408, 409, 418, 419, 421	(4½)
Microbiology 324, 325	(3)		
Biology 334	(1½)		
Electives[1]	(4½)		
Arts elective	(3)	Electives[1]	(7½)
	(18)		(18)

[1]Recommended Science electives:

Biology 300	(1½)	Biochemistry 301	(1½)	Computer Science 100	(1½)
Biology 301	(1½)	Biochemistry 402	(1½)	Computer Science 111	(1½)
Biology 320	(1½)	Biochemistry 403	(1½)	Computer Science 118	(1½)
Biology 323	(1½)	Chemistry 205	(3)	Mathematics 200	(1½)
Biology 328	(3)	Chemistry 301	(1½)	Medical Genetics 410	(1½)
Biology 330	(1½)	Chemistry 305	(3)	Microbiology 307	(1½)
Biology 332	(3)	Chemistry 313	(3)	Microbiology 318	(1½)
Biology 350	(3)	Chemistry 335	(3)	Microbiology 418	(1½)
Biology 435	(1½)				

NUTRITIONAL SCIENCES

Several faculties have cooperated to offer a program of study leading to a B.Sc. Major degree in Nutritional Sciences. The program in Nutritional Sciences is specifically intended for those students interested in basic nutritional sciences, who desire preparation for graduate study and research in Nutrition, and for students who plan to proceed to an area of Agricultural or Health Sciences in which a background in nutrition would be of value. All students take required courses in both animal (comparative) and human nutrition, but each student may select additional courses to emphasize one area or the other. For details of the program, please see the entry under the School of Family and Nutritional Sciences in this Calendar.

Note: Students enrolled in this program must register in the Faculty of Science, and are subject to all rules and regulations of this Faculty. Before registering for each of the Second, Third and Fourth years of this program, every student must obtain formal program approval from an advisor in either the School of Family and Nutritional Sciences or the Faculty of Agricultural Sciences.

OCEANOGRAPHY
(700 - OCGY)

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 Majors 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.

Enrolment in all combined Oceanography Honours programs requires an academic average of 70%.

Requirements for the B.Sc. degree:

Combined Oceanography and Biology Honours (10)
(700 - OCGY, 130 - BIOL)

First Year		Second Year	
Biology 101, 102, or 103	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 230	(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 courses numbered 300 or higher	(3)
Oceanography 406, 407, 408[3]	(4½)	Arts electives	(3)
Oceanography 449, Biology 449[4]	(3)	Science electives[2]	(9)
Biology 300, 334, 335	(4½)		
Biology 302, 303	(3)		
			(33)

[1]One of Geology 105, Geophysics 120 and Geology 125, Computer Science 114 and 116 (or 111 and 118), or Geography 101, and 6 additional units chosen from BIOL 204, 205, 209, 210; CHEM 205 (201 and 202); MATH 200, 201; MICB 200; PSYC 260; to include at least three units of courses on organisms, e.g. BIOL 209 (1½) and BIOL 205 (1½) or MICB 200 (3).
[2]MATH 200 is strongly recommended in Second or Third Year; Science electives may include additional Oceanography courses in Third and Fourth Years.
[3]Strongly recommended that this be taken in Third Year.
[4]If BIOL 449 is taken, an additional three units of Oceanography courses are required as part of the science electives.

Combined Oceanography and Chemistry Honours (10)
(700 - OCGY, 150 - CHEM)

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 electives	(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 414[3] or 405, 407	(4½)
Oceanography 308, 309, 408	(4½)	Oceanography 449 or Chemistry 449[4]	(3)
Science electives[2,3,4]	(3)	Arts electives	(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 111 and 118), Geography 101.
[2]Science electives may include additional Oceanography courses.
[3]Physics 312 or Mathematics 316 is prerequisite to Oceanography 414.
[4]If Chemistry 449 is taken, an additional 1½ units of Oceanography courses are required as part of the science electives.

Combined Oceanography and Geology Honours (10)
(700 - OCGY, 370 - GEOL)

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 200	(1½)
Mathematics 100, 101 (120, 121)	(3)	Mathematics 200, 221	(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 414[2] or 405	(1½)
Geology 302, 309	(3)	Oceanography 407, 416	(3)
Geology 304	(3)	Geology 426	(1½)
Geology 321	(1½)	Oceanography 449 or Geology 449	(3)
Oceanography 408	(1½)	Geology elective[3]	(3)
Arts electives	(3)	Science electives[4]	(1½)
Science elective[2]	(1½)	Arts electives	(3)
	(16½)		(16½)

[1]Recommended Biology 101 or 102 or 103 or Geophysics 221 or Computer Science 111 or 114.
[2]Oceanography 414 requires Mathematics 316 as a prerequisite.
[3]Recommended courses include Geology 303, 323, 342, 405, 406, 416, 421 and 431.
[4]Science electives may include additional Oceanography courses in Fourth Year.

Combined Oceanography and Geophysics Honours (10)
(700 - OCGY, 360 - GEOP)

First Year		Second Year	
Geophysics 120 and Geology 125	(3)	Computer Science 111	(1½)
Chemistry 110 or 120	(3)	Geology 200, 256	(3)
English 100	(3)	Mathematics 200, 201	(3)
Mathematics 100, 101 (120, 121)	(3)	Mathematics 221, 315	(3)
Physics 110 or 115 or 120	(3)	Physics 203, 209	(3)
		Arts electives	(3)
		Science elective[2]	(1½)
	(15)		(18)

Third Year		Fourth Year	
Oceanography 308, 309	(3)	Oceanography 414	(1½)
Physics 303, 309	(3)	Oceanography 449 or Geophysics 449[1]	(3)
Oceanography 408	(1½)	Geophysics 420, 421, 426	(4½)
Mathematics 316 (or Physics 312)	(1½)	Electives[2]	(7½)
Geophysics 320, 321, 322	(4½)		
Arts electives	(3)		
	(16½)		(16½)

[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 (10)
(700 - OCGY, 790 - PHYS)

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, 201, 221, 315	(6)
Physics 120 or 115 or 110	(3)	Science electives[2]	(3)
Elective	(3)	Arts electives	(3)
	(15)		(18)

Third Year		Fourth Year	
Physics 301, 308	(3)	Physics 401, 402	(3)
Physics 303, 304	(3)	Physics 406, 408	(2)
Physics 306	(1½)	Oceanography 414	(1½)
Physics 307, 309	(3)	Oceanography 409	(1)
Mathematics 316	(1½)	Oceanography 449 or Physics 449[3]	(3)
Oceanography 308, 309	(3)	Arts elective	(3)
Oceanography 408	(1½)	Science electives[4]	(3)
	(16½)		(16½)

[1]One of Geology 105 (or Geophysics 120 and Geology 125), Biology 101 or 102, Computer Science 114 and 116 (or 111 and 118), Geography 101.
[2]Recommended: more Computer Science, Mathematics, or Geography 212.
[3]If Physics 449 is taken, an additional 1½ units of Oceanography must be included in the science electives.
[4]Recommended from the following: Mathematics 300, Mathematics 345, Geography 301, Geography 302, Geophysics 322, Computer Science 302.

PHARMACOLOGY
(731 - PCTH)

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 (30)

First Year		Second Year	
Biology 101, 102, or 103	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 201, 202 (or 205)	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 230 (or 203)	(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	(3)
Pharmacology 300	(3)	Science electives[2]	(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, 333, 354; Chemistry 305, 313; Microbiology 302.

Honours (10)

First Year		Second Year	
Biology 101, 102, or 103	(3)	Biology 200, 201	(3)
Chemistry 110 or 120	(3)	Chemistry 201, 202 (or 205)	(3)
Mathematics 100, 101 (120, 121)	(3)	Chemistry 203	(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)	Pharmacology 449	(1½/3)
Physiology 303	(1½)	Physiology 422, 423 or 424	(1½)
Arts elective	(3)	Science electives[4]	(4½/3)
	(16½)		(16½)

[3]Suggested electives: Computer Science 101, 114, 116, Mathematics 200.
[4]In consultation with the Department; suggested electives: Pharmaceutical Sciences 435, 448; Biochemistry 402; Physiology 422, 423, 424; Biology 333; Chemistry 305, 313; Microbiology 302; Psychology 360.

PHYSICS
(790 - PHYS)

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.

Students entering second year Physics B.Sc. programs are encouraged but not required to obtain program approval before registering. Any second year student who meets program requirements may simply register in either Honours or Majors using the program descriptions listed in this Calendar. Continuing third and fourth year Physics students making satisfactory progress do not require program approval. Students wishing to transfer into Physics in third year must contact the Department to obtain program approval.

Students in the General Science Program are invited to consult a Departmental adviser concerning appropriate courses.

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 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 admissible into the second year Physics B.Sc. program with second-class standing. 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 Cooperative 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 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 (30)

First Year		Second Year	
Physics 120, 115 or 110	(3)	(Admission requirement: 60% standing	
Mathematics 100, 101 (120, 121)	(3)	in first year Physics course.)	
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)

Students should obtain better than the minimum passing mark in each of Physics 213, 215 and 216 to enrol in the Physics Major program.

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]		(5½)	
Arts Elective		(3)	
Electives		(10)	
		(30)	

[1]At least one basic course in Computer Science 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, 317, 318, 405, 406, 407, 409, 411, 414, 421. 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 (10)

First Year		Second Year	
Physics 120, 115 or 110	(3)	(Admission Requirements: A clear pass	
Mathematics 120, 121 (100, 101)	(3)	from First Year with an overall Second Class standing, or at least Second Class	
Chemistry 120 or 110	(3)	standing in each First Year Physics,	
English 100	(3)	Chemistry and Mathematics course.)	
Arts elective	(3)	Physics 200, 206[1]	(3)
		Physics 203[1], 209[1]	(3)
		Mathematics 200, 201[2]	(3)
		Mathematics 221, 315	(3)
		Arts Elective	(3)
		Science Elective[2,3]	(3)
	(15)		(18)

[1]PHYS 213, 216, 215 with First Class standing may be substituted for PHYS 203, 206 and 209 respectively.
[2]Mathematics 201 or 1½ units of Science Elective may be postponed to Third Year.
[3]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	
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[4]	(3)
Mathematics 300, 316	(4½)	Mathematics 400[5]	(3)
Elective	(1½)	Elective	(3)
	(16½)		(16½)

[4]Chosen from the following Physics courses: 305, 400, 403, 406, 407, 408, 473, 474, or 477.
[5]With the permission of the Head of the Physics Department another course may replace Mathematics 400.

Combined Physics and Astronomy Honours (10)
(790 - PHYS, 115 - ASTR)

First Year		Second Year	
As for Honours Physics	(15)	As for Honours Physics	(18)
		Recommended Science Elective	
		Astronomy 200	
Third Year		**Fourth Year**	
Physics 301, 304	(3)	Physics 306[1]	(1½)
Physics 303, 308	(3)	Physics 401, 402	(3)
Physics 307, 309	(3)	Astronomy 401, 402, 421, 431	(6)
Astronomy 302, 303	(3)	Astronomy/Physics 449	(3)
Mathematics 300, 316	(4½)	Electives[2]	(3)
	(16½)		(16½)

[1]Physics 306 may be taken in Third Year.
[2]Mathematics 400 is strongly recommended.

Combined Physics and Chemistry Honours (10)
(790 - PHYS, 150 - CHEM)

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).

Third Year		Fourth Year	
Physics 301, 308	(3)	Physics 307	(1)
Physics 303, 304	(3)	Physics 402	(1½)
Physics 309	(2)	Additional Physics	
Chemistry 304	(3)	per consultation[2]	(3)
Chemistry 310	(3)	Chemistry 311	(2)
Chemistry 312	(2)	Additional Chemistry	
Mathematics 316	(1½)	per consultation[2]	(4)
		Arts Elective	(3)
		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).

Combined Physics and Computer Science Honours
See Computer Science Programs

Combined Physics and Mathematics Honours[1] (10)
(790 - PHYS, 570 - MATH)

First Year		Second Year	
As for Honours Physics	(15)	Physics 200, 203	(3)
		Physics 206, 209	(3)
		Mathematics 223, 224, 226, 227	(6)
		Science Elective	(3)
		Arts Elective	(3)
			(18)
Third Year		**Fourth Year**	
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	
Mathematics 320	(3)	6 units of approved 4th year	
Mathematics 323	(3)	courses	(6)
		Electives	(3)
	(17)		(16)

[1]See Mathematics for language requirement.

Combined Physics and Oceanography Honours
See Oceanography Programs.

Courses Primarily for First-Year Science Students

Physics 11 (B.C. Secondary School) or equivalent is 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 PHYS 110.

MATH 100 and 101 (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 PHYS 340 and 341; (PHYS 230 does not require MATH 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 PHYS 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. PHYS 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 PHYS 120, MATH 100, MATH 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 PHYS 120 may substitute the First-Year Physics course for which they received academic credit, provided all other minimum requirements as stated were also met.

PHYS 110 is intended primarily for students who have completed only B.C. Secondary School Physics 11 or its equivalent. Credit will not normally be given to students with credit for Physics 12.

PHYS 115 is intended primarily for students who have completed B.C. Secondary School Physics 12. Students with only Physics 11 but with a good mathematics background may also take PHYS 115.

PHYS 120 is open to students who have obtained an A in one of Physics 12 or Algebra 12 and a B or better in the other course and who are particularly interested in and challenged by physical science and/or its application to other fields or disciplines.

Students who would prefer to register in a first year physics course with a higher number than the appropriate one as designated above, must obtain permission of a Physics adviser.

Non-science students without Physics 11 but with adequate mathematics may be allowed to take PHYS 110 at the discretion of the Department.

For students not specializing in Physics

PHYS 140 (3) is for first year students not in the Faculty of Science.

PHYS 340 (3), 341 (1½) and 440 (3) are primarily for students not in the Faculty of Science.

PHYS 317 (1½) and PHYS 318 (1½) are service courses available to General Science, Pre-Architecture and Education students.

PHYS 329 (1½) is for students not specializing in the Physical Sciences or Engineering.

PHYSIOLOGY
(800 - PHYL)

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 (10)

First Year		Second Year	
Biology 101, 102, or 103	(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), 331 (1½), 454 (1½). Psychology 260 (3).
Computer Science 111 (1½) or 124 and 126 (3). Psychology 360 (3).
Microbiology 200 (3).
Pharmacology and Therapeutics 305.

PSYCHOLOGY
(850 - PSYC)

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.

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 (30)

First Year[1]		Second Year	
Biology 101, 102 or 103	(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)	Biology 204 (1½)	
		Biology 205 (1½)	(3)
		Chemistry 230	(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 302 (1½), 303 (1½), 334 (1½), 350 (3),; Chemistry 205 (3); Classical Studies 301 (1½); Computer Science 111 (1½), 124 (1½), 126 (1½), 118 (1½), 302 (3); English 301 (1½), 302 (1½); Mathematics 200 (1½), 221 (1½), 318 (3), 344 (1½); Pharmacology 305 (3); Philosophy 214 (3), 407 (1½); Physics 326 (3), 329 (1½); Physiology 301 (3), 426 (1½); Statistics 304 (1½); Biology 310 (1½), 325 (1½), 331 (1½), 353 (3), 410 (1½), 453 (1½), 455 (1½), 456 (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 (10)

First Year[1]		Second Year	
Biology 101, 102 or 103	(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)	Biology 204 (1½)	
Physics 110 or 115 or 120	(3)	Biology 205 (1½)	
		Chemistry 230	(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 302 (1½), 303 (1½), 310 (1½), 325 (1½), 331 (1½), 350 (1½), 353 (1½), 410 (1½), 453 (1½), 455 (1½), 456 (1½); Chemistry 205 (3); Computer Science 111 (1½), 124 (1½), 126 (1½), 118 (1½), 302 (3); English 301 (1½), 302 (1½); Mathematics 200 (1½), 221 (1½), 318 (3), 344 (1½); Pharmacology 305 (3); Philosophy 214 (3), 407 (1½); Physics 326 (3), 329 (1½); Physiology 301 (3), 426 (1½); Statistics 304 (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
(939 - STAT)

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, every 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 (30)

First Year		Second Year	
Mathematics 100, 101		Statistics 200	(1½)
(120, 121)	(3)	Statistics/Mathematics 302	(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 124, 126[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)
Mathematics 303	(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, 304, 310, 322, 402, 404, 405, 406, 414, 420 are recommended. Note that many of these courses have 200-level Computer Science courses as prerequisites.

Honours in Statistics (10)

First Year		Second Year	
Mathematics 120, 121 (100, 101)	(3)	Statistics 200	(1½)
Chemistry 120 or 110	(3)	Statistics/Mathematics 302	(1½)
Physics 120 or 115 or 110	(3)	Mathematics 220, 221[2]	(3)
English 100	(3)	Mathematics 226, 227 (200, 201)	(3)
Computer Science 124, 126[1]	(3)	Arts Elective	(3)
		Electives	(4½)
	(15)		(16½)

Third and Fourth Years

In the third year: Statistics 305, 306 and Mathematics 303, 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 elective can be substituted by those eligible for Computer Science 118.
[2]Students are encouraged to substitute Mathematics 222 in the second year to satisfy the Mathematics 221/307 requirement.

Combined Honours in Mathematics and Statistics[1] (10)
(570 - MATH, 939 - STAT)

First Year		Second Year	
Mathematics 120, 121 (100, 101)	(3)	Statistics 200	(1½)
Chemistry 120 or 110	(3)	Statistics/Mathematics 302	(1½)
Physics 120 or 115 or 110	(3)	Mathematics 220, 222	(4½)
English 100	(3)	Mathematics 226, 227 (200, 201)	(3)
Computer Science 124, 126[2]	(3)	Arts Elective	(3)
		Electives	(3)
	(15)		(16½)
Third Year		**Fourth Year**	
Statistics 305, 306	(3)	Statistics 404, 405, 406	(6)
Mathematics 303, 320	(4½)	6 units from Mathematics 400, 418, 420, 422-426	(6)
Two of Mathematics 300 or 321, 322, 323	(6)	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 unit 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.

Major in Mathematical Sciences
See Computer Science Programs

ZOOLOGY
(990 - ZOOL)

The Department offers programs of study jointly with the Department of Botany leading to a bachelor's degree in Biology. There is no undergraduate degree in Zoology.

The Department of Zoology offers programs leading to the master's and doctoral degree. For details students are directed to the Faculty of Graduate Studies section of the calendar.

Facilities are available for advanced study and research in the following areas: Aquaculture, Biological Oceanography, Comparative Physiology, Developmental and Cell Biology, Ecology, Entomology, Ethology, Fish Biology and Fisheries, Genetics, Ichthyology and Limnology, Marine Biology, Parasitology, Vertebrate and Invertebrate Zoology and Zoogeography. Attention is directed to the following applied fields.

Aquacultural Science

An undergraduate degree program leading to a B.Sc. Major in Aquacultural Science is offered through the cooperation of several faculties. Students are directed to this listing in the calendar.

Ecology

The Ecology Group in the Department of Zoology offers research opportunities at the local, national and international level in Aquatic, Evolutionary, Mathematical, Population and Resource Ecology.

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. 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.

Fish Biology and Fisheries

The Fish Biology and Fisheries Group maintains a strong tradition in fish-oriented research at the University of British Columbia. Studies range from physiology, ethology, biomechanics, systematics and evolution, through marine and freshwater ecology, to fisheries oceanography and management (population modelling, and fisheries economics). In addition to facilities on campus, Federal and Provincial agencies encourage research in cooperation with government scientists, many of whom serve on students' Research Advisory Committees.

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.

THE SCHOOL OF SOCIAL WORK

(A School within the Faculty of Arts)

ADMINISTRATIVE STAFF

Director of the School	GLENN DROVER
Coordinator of Field Instruction	NANCY DICKSON
Coordinator of Continuing Education	DAVID FREEMAN
Administrative Officer	SUSAN COLE MARSHALL
Librarian	BEVERLEY SCOTT

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).
DAVID S. FREEMAN, B.A. (Calif. State, Los Angeles), M.S.W., D.S.W. (U.S.C.).

Associate Professors

KLOH-ANN AMACHER, B.S. (Oregon), M.S.W. (Calif., Berkeley), D.S.W. (Smith).
JOHN A. MACDONALD, B.A., LL.B., B.S.W. (Brit. Col.), M.S.W. (Washington).
KATHRYN McCANNELL, B.S.W., M.A., Ph.D. (Manitoba).
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.).
NANCY WAXLER-MORRISON, B.A. (Illinois), Ph.D. (Harvard).

Assistant Professors

JOHN DEAKINS, B.A. (London), M.A., Ph.D. (Chicago).
HAROLD G. GOODWIN, B.A. (Mount Allison), M.S.W. (Brit. Col.).
MADELINE LOVELL, B.A., M.S.W. (Toronto), Ph.D. (Washington).
P. ROSS McCLELLAND, B.A., B.Com. (Queen's), M.S.W. (Toronto).
PAULE McNICHOL, B.A., B.S.W. (Laval), M.S.W., Ph.D. (Washington).
ROOP SEEBARAN, B.A., B.S.W., M.S.W. (Brit. Col.).
FRANK TESTER, B.Sc. (Western), M.E.Des., M.S.W. (Calgary), D.Phil. (Waikato).
SHARON MANSON WILLMS, B.S.W. (Victoria), M.S.W. (Brit. Col.), Ph.D. (Brandeis).

Field Placement Agencies

ALCOHOL AND DRUG PROGRAMS
ARTHRITIS SOCIETY
B.C. ASSOCIATION OF SOCIAL WORKERS
B.C. PARENTS IN CRISIS
BRITANNIA COMMUNITY SERVICES CENTRE
CANCER CONTROL AGENCY
PROBATION AND FAMILY COURT SERVICES — MINISTRY OF THE ATTORNEY GENERAL
CEDAR COTTAGE NEIGHBOURHOOD HOUSE
CHESTERFIELD HOUSE SOCIETY
CHILDREN'S ADVOCATE, SOCIAL PLANNING, VANCOUVER CITY HALL
CHILDREN'S HOSPITAL
COAST FOUNDATION SOCIETY
DELTA YOUTH SERVICES
FAMILY PRACTICE CLINIC, U.B.C.
FAMILY SERVICES OF GREATER VANCOUVER
FIRST UNITED CHURCH
G.F. STRONG REHABILITATION CENTRE
GEORGE DERBY CENTRE
GREATER VANCOUVER MENTAL HEALTH SERVICES
CONTINUING CARE DIVISION, RICHMOND HEALTH DEPARTMENT
HOME SUPPORT SERVICES
IMMIGRANT SERVICES CENTER (OASIS)
JUVENILE SERVICES TO THE COURT
KINSMAN REHABILITATION FOUNDATION
KITSILANO NEIGHBOURHOOD HOUSE
KIWASSA NEIGHBOURHOOD HOUSE
MAYOR'S TASK FORCE ON SENIORS
MINISTRY OF SOCIAL SERVICES AND HOUSING
MOUNT PLEASANT FAMILY CENTER
NISHA CHILDREN'S SOCIETY
ODYSSEY I AND II
PEAK HOUSE
RIVERVIEW HOSPITAL
SENIORS' BUREAU, NEW WESTMINSTER
SINGLE MOTHERS HOUSING NETWORK
SOUTH VANCOUVER NEIGHBOURHOOD HOUSE
SPARC OF B.C.
ST. PAUL'S HOSPITAL
ST. VINCENT'S HOSPITAL
STRATHCONA COMMUNITY CENTRE
SUCCESS
THE NEW VISTA SOCIETY
UNITED WAY — LOWER MAINLAND
UNIVERSITY HOSPITAL — SHAUGHNESSY SITE
UNIVERSITY HOSPITAL — UBC SITE
VANCOUVER HEALTH DEPARTMENT
VAST
VANCOUVER GENERAL HOSPITAL
WEST SIDE FAMILY PLACE
WESTERN INSTITUTE FOR THE DEAF
WOMEN'S RESOURCE CENTRE
YOUTH RESIDENTIAL PROJECT
Y.W.C.A.

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 program for persons with a B.A. or equivalent degree, 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 PROGRAMS

B.S.W. Program for Undergraduates

Educational Objectives

The educational objectives of the B.S.W. program for undergraduates are:

1. To provide students with the knowledge and skills necessary to begin professional practice in social work.
2. To prepare selected students for entry into more advanced professional studies at the graduate level.

Admissions

1. Admission to the Undergraduate 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 this 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; and a 1½ unit course in statistics.
   (c) To demonstrate to the satisfaction of the School personal potential and suitability for a career in social work.
3. The deadline for application for the undergraduate program is February 28. Application forms must be obtained from the School.
4. For second-year students considering application to the program, the School's faculty provides a consultant and advisory service.
5. 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: Social issues and problems in contemporary perspective* - 3 units; Dynamics of human behaviour, individual or collective* - 3 units	
Total	30
Third Year:	
SOWK 300: Canadian Social Services I	3
SOWK 305: Social Work Intervention I	3
SOWK 315: Practicum I	3
SOWK 320: Social Work Research	3
SOWK 335: Human Behaviour and Social Environment	3
Total	15
Fourth Year:	
SOWK 400: Canadian Social Services II	1½
SOWK 405: Social Work Intervention IIA	3
OR	
SOWK 410: Social Work Intervention IIB	
SOWK 415: Practicum II	3
Arts — Elective course(s) in the Social Sciences*	3
SOWK 430: Special Studies in Social Work and/or courses in the Social Sciences and the Humanities.*	4½
Total	15

* Details on elective courses 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

This program is designed for persons with a B.A. or equivalent degree who wish to acquire the B.S.W. degree, 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. Prior academic work must include 12 units of required course work in the Social Sciences, and a 1½ unit course in statistics. A list of courses to meet these requirements is available from the School of Social Work.
2. The following will influence the rating of applications:
   A high academic average in previous degree work.
   Personal suitability and potential for social work based on a written 'Personal Statement', relevant work experience and references submitted by the applicant.
3. The deadline for application is January 31. Application forms must be obtained from the School. Given resource limitations, the School may not be able to accept all applicants who meet the foregoing admission requirements.

Pattern of Courses

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 305: Social Work Intervention I	3
SOWK 315: Practicum I	3
SOWK 320: Social Work Research	3
SOWK 336: Social Sciences and Social Work Practice	1½
SOWK 400: Canadian Social Services II	1½
SOWK 405: Social Work Intervention IIA	3
OR	
SOWK 410: Social Work Intervention IIB	
SOWK 415: Practicum II	3
Total	21

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.

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.

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 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.

Courses in the Faculty of Arts numbered 300 and above are open to First-Year students only if listed on List A and to Second-Year students only if listed on Lists A or B (see Index "Arts, Faculty of").

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 will be determined by the student in **consultation** with the department offering the course. 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.

COURSE ABBREVIATIONS LISTED ALPHABETICALLY

Dept. Course Abbreviation	
ADED	Adult Education
AGEC	Agricultural Economics
AGME	Agricultural Mechanics
AGSC	Agricultural Sciences
ANAE	Anaesthesiology
ANAT	Anatomy
ANSC	Animal Science
ANTH	Anthropolgy
APSC	Applied Science
ARBC	Arabic
ARCH	Architecture
ARST	Archival Studies
ARTE	Art Education
ARTS	Arts One Program
ASIA	Asian Studies
ASLA	Asian Languages
ASTR	Astronomy
ATSC	Atmospheric Science
AUDI	Audiology and Speech Sciences
BIOC	Biochemistry
BIOE	Bio-Resource Engineering
BIOL	Biology
BOTA	Botany
BUED	Business Education
CHEM	Chemistry
CHIN	Chinese
CHML	Chemical Engineering
CIVL	Civil Engineering
CLST	Classical Studies
CMTE	Communications Media Technology
CNPS	Counselling Psychology
COML	Comparative Literature
COMM	Commerce
CPSC	Computer Science
CRWR	Creative Writing
CSED	Computing Studies Education
CZVK	Czecho-Slovak
DENT	Dentistry
EADM	Educational Administration
ECED	Early Childhood Education
ECON	Economics
EDCI	Education—Curriculum and Instructional Studies
EDPS	Educational Psychology
EDST	Educational Studies
EDUC	Education
ELEC	Electrical Engineering
ENED	English Education
ENGL	English
FINA	Fine Arts
FMPR	Family Practice
FMSC	Family Science
FMST	Family Studies
FOOD	Food Science
FORH	Forest Harvesting
FREN	French
FRST	Forestry
GENE	Genetics
GEOG	Geography
GEOL	Geological Sciences
GEOP	Geophysics
GERM	German
GMST	Germanic Studies
GREK	Greek
HCEP	Health Care and Epidemiology
HEBR	Hebrew
HIED	Higher Education
HIND	Hindi (see Asian Studies: South Asian Languages)
HIST	History
HMEC	Home Economics
HMED	Home Economics Education
HUNU	Human Nutrition
INDE	Interdepartmental Medicine
INDO	Indonesian (see Asian Studies: South Asian Languages)
INDS	Interdisciplinary Studies
INED	Industrial Education

Dept. Course Abbreviation	
ITAL	Italian
ITST	Italian Studies
JAPN	Japanese (see Asian Studies)
KORN	Korean (see Asian Studies)
LARC	Landscape Architecture
LATN	Latin
LAW	Law
LIBE	Library Education
LIBR	Librarianship
LING	Linguistics
MAED	Mathematics Education
MATH	Mathematics
MDVL	Medieval Studies
MECH	Mechanical Engineering
MEDG	Medical Genetics
MEDH	History of Medicine
MEDI	Medicine
MICB	Microbiology
MLED	Modern Languages Education
MMAT	Metals and Materials Engineering
MMPE	Mining and Mineral Process Engineering
MRNE	Marine Science
MUED	Music Education
MUSC	Music
NRSC	Neuroscience
NURS	Nursing
OBST	Obstetrics
OCGY	Oceanography
OMSS	Oral, Medical and Surgical Sciences (see Dentistry)
OPTH	Ophthalmology
ORBI	Oral Biology (see Dentistry)
ORPA	Orthopaedics
PAED	Paediatrics
PATH	Pathology
PCTH	Pharmacology and Therapeutics
PHAR	Pharmaceutical Sciences
PHED	Physical Education
PHIL	Philosophy
PHYL	Physiology
PHYS	Physics
PLAN	Planning (see Community & Regional Planning)
PLNT	Plant Science
POLI	Political Science
POLS	Polish
PORT	Portuguese (see Spanish & Portuguese)
PSYC	Psychology
PSYT	Psychiatry
PUNJ	Punjabi (see Asian Studies: South Asian Languages)
RADI	Radiology
READ	Reading Education
RECR	Recreation
RELG	Religious Studies
RHME	Rehabilitation Medicine
RMST	Romance Studies
RUSS	Russian
SANS	Sanskrit (see Asian Studies: South Asian Languages)
SCED	Science Education
SCIE	Science
SEAL	Southeast Asian Languages
SLAV	Slavonic Studies
SOAL	South Asian Languages (see Asian Studies)
SOCI	Sociology
SOIL	Soil Science
SOWK	Social Work
SPAN	Spanish
SPED	Special Education
SSED	Social Studies Education
STAT	Statistics
SURG	Surgery
THTR	Theatre
UKRN	Ukrainian
URDU	Urdu (see Asian Studies: South Asian Languages)
URST	Urban Studies
WMST	Women's Studies
WOOD	Wood Science and Industry
ZOOL	Zoology

Adult Education (ADED)

(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 for 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 education. 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 (AGEC)
(Faculty of Agricultural Sciences)

*Additional Field Trip fees are charged for this course. See Index "Fees—Special Fees".

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; 3-0]

260. (1½) *Introduction to Analytical Methods in Agricultural Economics.* — Linear and nonlinear 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. [3-0; 0-0]

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. [3-2; 0-0]

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. [0-0; 3-0]

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 Sciences (AGSC)
(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]

110. (1½) *Introduction to Food Production Systems*—A study of the fundamental concepts and principles underlying food production systems. [0-0; 3-2]

199. (0) *Co-operative 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]

298. (0) *Year-Round Co-operative Work Placement I.*—Approved and supervised technical work experience in the food and agricultural sector for a minimum of 3½ months. Technical report required. Restricted to students meeting the requirements of the Faculty of Agricultural Sciences and a Year-Round Co-operative Education Program.

299. (0) *Co-operative 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".)

397. (0) *Year-Round Co-operative Work Placement II.*—Approved and supervised technical work experience in the food and agricultural sector for a minimum of 3½ months. Technical report required. Restricted to students meeting the requirements of the Faculty of Agricultural Sciences and a Year-Round Co-operative Education Program.

398. (0) *Year-Round Co-operative Work Placement III.*—Approved and supervised technical work experience in the food and agricultural sector for a minimum of 3½ months. Technical report required. Restricted to students meeting the requirements of the Faculty of Agricultural Sciences and a Year-Round Co-operative Education Program.

399. (0) *Co-operative 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; 2-2]

497. (0) *Year-Round Co-operative Work Placement IV.*—Approved and supervised technical work experience in the food and agricultural sector for a minimum of 3½ months. Technical report required. Restricted to students meeting the requirements of the Faculty of Agricultural Sciences and a Year-Round Co-operative Education Program.

498. (0) *Year-Round Co-operative Work Placement V.*—Approved and supervised technical work experience in the food and agricultural sector for a minimum of 3½ months. Technical report required. Restricted to students meeting the requirements of the Faculty of Agricultural Sciences and a Year-Round Co-operative Education Program.

Anaesthesiology (ANAE)
(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. Audiovisual 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 and Therapeutics. 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 (ANAT)
(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 350, Biology 353, or Physiology 301. 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. 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. (1½) *Cell Structure and Function.*—Seminar discussions of current topics in vertebrate cell biology.

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.*—Selected topics in muscle contraction at an advanced level. Permission of Head required. (Same as PHYL 530.)

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 (ANSC)
(Faculty of Agricultural Sciences)

***Courses which have Science credit are preceded by an asterisk**

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]

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 laboratory analysis in relation to assessment of the nutritive value of feeds and feed ingredients: laboratory exercises in feed analysis. Prerequisite: Animal Science 322 or corequisite Human Nutrition 305 and 307. Credit will be given for only one of Animal Science 321 and Human Nutrition 309. [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. Credit will not be given for both Animal Science 322 and either Human Nutrition 305 or 307. [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 either Animal Science 322 or Human Nutrition 305 and 307. Credit will be given for only one of Animal Science 323 and Human Nutrition 309. [0-0; 2-3]

406. (1½) *Physiology of Reproduction.*—Physiological mechanisms related to reproduction, breeding efficiencies, fertility and milk secretion. [0-0; 2-2]

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]

417. (1½) *Animal Diseases.*—Basic pathological changes associated with mammalian, avian and fish diseases. Prerequisites: MICB 200 and ANSC 320. [3-2; 0-0]

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: Biology 310 or Psychology 306. [2-2; 0-0]

*425. (1½) *Comparative Nutrition.*—Qualitative and quantitative differences in nutritional requirements of terrestrial and aquatic species. Comparative physiology of digestion, metabolism and excretion. Efficiency of nutrient utilization. Nutrient sources and availability in the food supply of various species. Prerequisites: Human Nutrition 305 and 307 or Animal Science 321 and 322; a course in biochemistry; a course in physiology. [0-0-0; 3-0-2]

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. Prerequisite: Animal Science 413, Plant Science 322 and Computer Science 101. [1-0-1; 1-0-1]

430. (1-3)**c** *Directed Studies.*—On an approved problem.

435. (1½) *Poultry Production.*—Application of biological principles to the breeding, feeding and management of avian species. Students from outside the department require permission of the Head of Department. [0-0; 3-2]

437. (½) *Avian Diseases.*—Common diseases of poultry, game birds and selected wild avian species. Disease prevention, with emphasis on the importance of proper management procedures in dealing with specific diseases. Prerequisite: ANSC 417. [0-0; 1-1*]

439. (1½) *Avian Physiology.*—Growth and reproduction, response to environmental factors, recent advances in endocrinology related to avian species. Prerequisite: ANSC 320. [0-0; 3-2]

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]

447. (½) *Livestock Diseases.*—Common diseases of livestock and selected species of wild animals. Disease prevention, with emphasis on proper management procedures in dealing with specific diseases. Prerequisite: ANSC 417. [0-0; 1-1*]

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]

*480. (1½) *Intensive Fish Production.*—Management of finfish throughout the life cycle; broodstock, egg, larvae and juvenile. Control of environmental factors, including pathogens, for maximum productivity at all life stages. Prerequisite: Animal Science 320 or equivalent. [3-2; 0-0]

*481. (1½) *Fish Nutrition.*—Physiology of digestion and excretion, nutrient requirements, sources of nutrients, diet formulation, feeding management. Prerequisite: Animal Science 322. [0-0; 3-0]

*482. (1½) *Fish Breeding in Aquaculture.*—Applications of animal breeding and genetic manipulation techniques for the improvement of domesticated fish species for aquaculture. Techniques for control of sex determination and differentiation. Prerequisite: Animal Science 313. [0-0; 3-2]

487. (½) *Fish Diseases.*—Common diseases of cultured and wild fish. Preventive programs in the control of disease will be emphasized in dealing with specific diseases. Prerequisite: ANSC 417. [0-0;1-1*]

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. (Not offered every year.)

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. (Not offered every year.) [2-3; 0-0]

513. (3) *Quantitative Genetics.*—Concepts and recent research in quantitative inheritance, behavioural and evolutionary genetics. (Not offered every year.) [3-0; 3-0]

514. (3) *Applications of Quantitative Genetics.*— Population genetics, polygenic systems and selection theory as applied to animal populations. (Not offered every year.) [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).

525. (1-3)**d** *Advances in Comparative Nutrition.*—Qualitative and quantitative differences in nutritional requirements of terrestrial and aquatic species. Recent advances in the physiology of digestion, metabolism and excretion. Prerequisite: Animal Science 425.

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.*

580. (1½) *Advanced Topics in Fish Culture.*—An interdisciplinary seminar course, involving disciplines of importance to fish culturists.

581. (1½) *Fish Diseases.*—Common diseases of fish. Epidemiology, zoonotic potential, prevention and treatment of diseases.

649. *Ph.D. Thesis.*

Anthropology (ANTH)

(Faculty of Arts)

Notes:

1. Anthropology 100, 200, 201, 202, 203, 206, 213, 214, 215, 217, 220, 221, 240, 301, 315, 320, 321, 322, 323, 325, 329 are general courses open to all students.
2. Anthropology 200 is prerequisite to all other third- and fourth-year courses, unless permission of the instructor is obtained. Some courses have additional prerequisites, as listed in the descriptions.

*Additional Field Trip fees are charged for this course. See Index "Fees—Special Fees".

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 examines such concepts as: ethnicity, racism, prejudice, discrimination, assimilation, and multiculturalism. Ordinarily the course deals with ethnic groups in British Columbia, and students are expected to carry out elementary research projects. (Same course as Sociology 201.) [3-0] or [3-0; 3-0]

202. (1½/3)**d** *Contemporary Social Problems 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.*—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.*—The study of medieval and modern culture, with 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.*—An exploration of topics from Anthropology and/or Sociology focusing on explanations, in current and historical perspective, for variations in the situation of women. (Same course as Sociology 213.) [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; and the sexual division of labour, property, and inheritance. (Same course as Sociology 214.) [3-0] or [3-0; 3-0]

215. (1½/3)**d** *Introduction to Japanese Society.*—Survey of contemporary Japanese life, with a focus on social organization and cultural patterns. Topics may include family, kinship, rural and urban conditions, economic organization, class and other inequalities, ethnic relations, and introduction of Western culture and value systems. (Same course as Sociology 215.) [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, Myth, and Ceremonies.*—Traditional arts and myths, using the collections of the Museum of Anthropology. [3-0]

240. (1½) *Introduction to the Study of Human Evolution.*—A macroevolutionary 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. Not for credit towards the Major or Honours degree. [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. 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 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. Anthropology 203 is recommended as preparation for this course. [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. Prerequisite: Anthropology 305 or permission of the instructor. [3-3]

310. (1½/3)**d** *Urban Anthropology.*—Structure, organization, and development of non-western 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]

312. (1½/3)**d** *Gender Relations.*—The nature of gender relations, their social and cultural expression, and theories of gender inequality drawn from anthropological or sociological research. (Same course as Sociology 312.) [3-0] or [3-0; 3-0]

315. (1½/3)**d** *Japanese Culture and Society.*—An intensive examination of modern industrial Japan, including such topics as: demographic characteristics, class structure and inequality, industrial organization, political structure and conflict, ethnic relations, value systems, urban and rural traditions, and cultural background of current events. Major theories of Japanese culture and economic development will be studied. (Same course as Sociology 315.) [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]

317. (1½/3)**d** *Linguistic Anthropology.*—A survey of the ethnographic uses of language data and the techniques of linguistic analysis. An introductory course in linguistics is recommended as preparation for this course. [3-0] or [3-0; 3-0]

318. (1½) *Statistical Methods 1.*—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 and Honours students in Anthropology. Prerequisite: Algebra 11. (Same course as Sociology 318.) [3-0]

320. (3) *Prehistory of the Old World.*—Detailed examination of the prehistory 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 programs. [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. Not available for credit in the Major and Honours programs. [3-0]

323. (1½) *Archaeological Foundations of New World Civilizations.*—A survey of the archaeology of Mesoamerica and Andean South America, concentrating on the origins and development of complex society. Theories on the evolution of civilization will be compared with the archaeological evidence. Not available for credit in the Major and Honours programs. [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. (1½/3)**d** *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] or [3-0; 3-0]

331. (1½/3)**d** *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] or [3-0; 3-0]

332. (1½/3)**d** *Oral Tradition.*—An ethnographic perspective on the dynamics of oral tradition in various oral and literate cultures; the characteristics and roles of oral genres including folktale, genealogy, oral history, autobiography, and myth in these societies; and the relationship between orality and literacy. [3-0] or [3-0; 3-0]

333. (1½/3)**d** *The Analysis of Myth.*—The analysis of myth as performance and text; the relation of myth to social structure, symbolic analysis, comparative studies of myth, and the analysis of the structure of myth. [3-0] or [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 of the Museum of Anthropology. Particular cultures or regions will be emphasized each term. [3-0] or [3-0; 3-0]

350. (1½/3)**d** *Ethnography of the Pacific Islands: Polynesia and Micronesia.*—Major cultural groupings on Polynesia and Micronesia, emphasizing both traditional cultures and the incorporation of the region into modern international institutions. [3-0] or [3-0; 3-0]

351. (1½/3)**d** *Ethnography of the Pacific Islands: Melanesia.*—Major cultural groupings in Melanesia, emphasizing both traditional cultures and the incorporation of the region into modern international institutions. [3-0] or [3-0; 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]

409. (1½/3)**d** *Topics in Applied Anthropology*.—Advanced study of the theory and practice of applied, action, and consultancy anthropology. Topics may include the application of anthropology to education, medicine, development, women and development, tourism, native land claims, and other social issues. [3-0] or [3-0; 3-0]

410. (1½/3)**d** *Prehistory of a Special Area in Asia or Oceania*.—Analysis of the prehistory of a selected area, including a summary of the literature and the discussion of relevant problems. The course will provide background for students in area studies such as Oceania and the Far East. Prerequisite: Anthropology 305 or permission of the instructor. [3-0] or [3-0; 3-0]

411. (1½/3)**d** *Prehistory of a Special Area in the New World*.—Analysis of the prehistory of a selected New World area, including a summary of the literature and discussion of relevant problems. The course will provide background for students in North, Central, and South American area studies. Typical offerings include the prehistory of Mesoamerica, the Southwest, North America, and the Mayan areas. Prerequisite: Anthropology 305 or permission of the instructor. [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. (Same course as Sociology 413.) [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, practices, and movements; relations between religious, social, and political institutions; religion as a force for stability and change; anthropological/sociological theories of religion. (Same course as Sociology 415.) [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 the 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 the 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 governments, consultants, sponsors, and Indian bands are explored with emphasis on recent developments. Prerequisite: Anthropology 305 or permission of the instructor. [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]

426. (1½) *Anthropometry and Osteometry*.—Methods and techniques to describe morphological variability in living human populations and skeletal material. Techniques of measurement and statistical description and reconstruction of the morphology of the living person from skeletal features. Musculo-skeletal anatomy will be reviewed. Prerequisite: Statistics 203 or equivalent, or permission of the instructor. [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 Department faculty member selected by the student. 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 Major and Honours students; 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 Major and Honours students; other students by permission of the 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 on 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** *Topics in Contemporary Theory*.—Selected topics in contemporary social and cultural theory which contribute to anthropological analyses. Topics may include Marxist anthropology, critical theory, theories of culture, phenomenology, behavioural ecology, structuralism, hermeneutics, formal theory, and examination of specific social theorists. [3-0] or [3-0; 3-0]

495. (1½/3)**d** *Advanced Studies in Anthropology*.—An intensive examination of selected topics in Anthropology. Consult the Department for this year's offerings. [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. (1-9)**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** *Psychological Anthropology*.

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.

517. (1½) *Archaeological Methods*.—A discussion of selected basic data-gathering methods in their relation to the development of ideas about the archaeological record.

518. (1½) *Museum Methods*.—Analytical approaches to the study of museums and collections. Methods of field collecting, collections research, laboratory procedures, visitor studies, social organization of museum and related cultural industries, exhibit and program evaluation techniques, and the ethics of museum research and practice. Prerequisite: Anthropology 431 or permission of the instructor.

520. (1-3)**c** *Advanced Prehistory of a Special Area*.

525. (1-3)**d** *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; and 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*.

551. (1½/3)**d** *Cultural Studies in Communication and Interpretation*.—History, theories, principles and techniques of communication and interpretation of cultural materials. Topics include examination of how various media (script, objects, film, video) are used to interpret histories, society, and culture in museums, art galleries, historic sites, and related areas; and how communication programs are planned, implemented, and assessed. Prerequisite: Anthropology 431 or permission of the instructor.

649. *Ph.D. Thesis*.

Applied Science (APSC)
(Faculty of Applied Science)

110. (0) *Co-operative 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 done by practising Engineers in different disciplines. [1-0-0; 0-0-0]

151. (1½) *Computer Aided Engineering Graphics.*—Orthographic projection, technical sketching, development of the ability to visualize in three dimensions. Standards and conventions of engineering drawing, graphical presentation of engineering data. Micro-computer based graphics aids. Engineering geometry and the solution of space problems. [1-0-4; 0-0-0] or [0-0-0; 1-0-4]

210. (0) *Co-operative 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.

211. (0) *Year-Round Co-operative Work Placement II-A.*—The first supervised, technical work experience in an approved 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 a year-round Engineering Co-operative Education Program.

212. (0) *Year-Round Co-operative Work Placement II-B.*—The second supervised, technical work experience in an approved 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 a year-round Engineering Co-operative Education Program.

261. (1½) *Technology and Society I.*—The course deals with the influence of technology on the social, political, economic, and environmental aspects of society. The specific subject matter varies from year to year. Examples of subjects considered include, resources, energy, nuclear power, technology, the effects of technology on the family, education, agriculture, international policy and others. [2-0-1; 0-0-0]

262. (1½) *Technology and Society II.*—The course deals with the influence of technology on the social, political, economic and environmental aspects of society. The subject matter varies from year to year and differs from APSC 261. It may be taken as a continuation of APSC 261 or taken independently. Examples of subjects considered include pollution, work place health hazards, social impact of computers, problem solving, green revolution, technology and the third world, engineering ethics and others. [0-0-0; 2-0-1]

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) *Co-operative 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.

311. (0) *Year-Round Co-operative Work Placement III-A.*—The first supervised, technical work experience in an approved 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 a year-round Engineering Co-operative Education Program.

312. (0) *Year-Round Co-operative Work Placement III-B.*—The second supervised, technical work experience in an approved 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 a year-round Engineering Co-operative 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) *Co-operative 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.

411. (0) *Year-Round Co-operative Work Placement IV-A.*—The first supervised, technical work experience in an approved 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 a year-round Engineering Co-operative Education Program.

412. (0) *Year-Round Co-operative Work Placement IV-B.*—The second supervised, technical work experience in an approved 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 a year-round Engineering Co-operative Education Program.

450. (½) *Professional Engineering Practice.*—Legislation affecting the practice of engineering, ethical principles and responsibilities involved; development of contemporary engineering organizations. Restricted to engineering undergraduate students in the final year of their degree program. [1-0-0; 0-0-0]

459. (2) *Engineering Physics Projects I.*—Experimental work on projects designed to give research development and design experience with equal time commitment in Engineering and Science. Students are expected to give at least one seminar each term about their projects. Students should consult the Program Director for Engineering Physics for details. [0-0-1*; 0-6-1]

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]

480. (1½) *Engineering Physics Projects III.*—An optional course for those students wishing to continue their project work beyond the development in APSC 479. Prerequisite: APSC 479. [0-0-0; 0-5-1]

510. (2) *Advanced Technology Internship.*—Work in a technological setting on commercial and managerial aspects of an industrial project. A required internship to be taken at the end of the first year of the M.Eng. (Advanced Technology Management) program.

511. (1) *Advanced Technology Management Colloquium.*—Student reports on internship, guest speakers from industry, preparation of group projects, joint study of industrial reports. Required of students enrolled in the M.Eng. (Advanced Technology Management) program.

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.

Arabic (ARBC)
(Department of Religious Studies, Faculty of Arts)

300. (3) *Introduction to the Grammar and Vocabulary of Classical Arabic.*—Open to first- and second-year students with the permission of the instructor. Offered in alternate years. [3-0; 3-0]

400. (3) *Intermediate Classical Arabic.*—Second year of Classical Arabic with extensive reading of poetry and prose drawn from religious and historical texts. Prerequisite: Arabic 300 or equivalent. [3-0; 3-0]

Archaeology—See Archaeology under **Programs in the Faculty of Arts** for acceptable courses.

Architecture (ARCH)
(School of Architecture, Faculty of Applied Science)

**Additional fees are charged for these courses. See Index "Fees—Special Fees".

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 and student papers. Open to students outside the School. With the permission of the Director, ARCH 404 and 405 may be replaced by appropriate courses in the Department of Fine Arts.

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 and student papers. Open to students outside the School. With the permission of the Director, ARCH 404 and 405 may be replaced by appropriate courses in the Department of Fine Arts.

**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 non-refundable fee will be charged to cover experises.)

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 School's 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 vary 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 1*.—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*.—A seminar covering current theories of architecture, based on reading assignments, papers and presentations. Enrolment is limited to facilitate discussion.

446. (1½) *Current Issues in Architecture*.—A seminar examining current issues in Architecture, based on reading assignments, papers and presentations. Enrolment is 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. (1½/3)**d** *Architectural Seminar*.—An explanation of selected topics in architecture. Course enrollments will be restricted. Permission of instructor required.

459. (1½/3)**d** *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 Schcol 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 the pre-design process employed to clarify project objectives, define client/user requirements, test alternative organizations, generate space-planning schemata, involve users in the development of design parameters and critical environmental and technical performance criteria. 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. (0) *Architecture Seminar.*—A forum for the exchange of ideas and presentation of papers by faculty, students and visitors.

503. (1½/3)**d** *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. (1½/3)**d** *Planning the Residential Environment.*—Studies of the principles of physical development of residential sites in metropolitan areas and their architectural ramifications. Field trips included.

508. (1½/3)**d** *Programming for Building Users.*—Examination of theories related to value-laden and probabilistic decision-making in architectural programming. Prerequisite: ARCH 474 or equivalent experience with architectural programming or management.

509. (1½/3)**d** *Facilities Programming.*—Individual and/or group study of advanced facilities programming for complex projects.

512. (1½/3)d** *Urban Design Studies.*—Individual and/or group design exercises to develop architectural strategies within the context and scale of urban developments.

513. (1½/3)**d** *History of Housing.*—Segments of the history of housing. Selected according to faculty availability and student interest.

532. (1½/3)**d** *Advanced Building Science.*—Study of scientific technique applied to the design and appraisal of the built environment and its performance.

548. (1½/3)**d** *Special Topics.*—Individual or small group study of special topics.

549. (6) *Thesis for the M.A.S.A. Degree*

Archival Studies (ARST)

(School of Library, Archival and Information Studies, Faculty of Arts.)

500. (1½) *Fundamentals of Archives I.*—The evolution of the concept of archives; their nature, scope and characteristics. The theory and practice of arrangement and preparation of archival finding aids.

501. (1½) *Organization and Administration of Archival Institutions.*—The historical development of archival repositories in Canada and the United States, and the legislation and regulations governing them. Types of repositories and their organizational structure. Evolution of the policies, procedures, and programs of archival institutions. Comparisons with the development of archives in other countries.

502. (1½) *Fundamentals of Archives II.*—Appraisal of archives for acquisition and selection: principles and practices.

503. (1½) *Reference Service and Access to Archives.*—The archivist as cultural mediator and public official. Uses of archives and methods of research using archives. Legislation, regulations, principles and practices governing access. Public services and programming.

504. (1½) *Description and Indexing of Archives.*—Application of methods of bibliographic control to description and indexing of archives. Rules for description and formation of access points. Basic verbal subject analysis and representation.

505. (1½) *Government Records in Canada.*—The evolution of the documentation function of Canadian federal, provincial, and municipal governments. Emphasis will be on study of administrative structures, bureaucratic procedures, and documentary processes.

510. (1½) *Records Management.*—Principles and practices of management of active and semi-active records: classification, description, maintenance, use, and scheduling. Records management as a function of archival institutions.

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.

600. (1½) *Practicum.*—All students are required to undertake a practicum of at least one month's duration in a recognized archival repository under the supervision of a senior archivist and offering experience of the basic archival functions. Prerequisite: successful completion of first-year studies.

601. (1½) *Diplomatics.*—Principles, concepts, and methodology for identification and critical evaluation of archival sources created in any time and place, and on any medium. Analysis of archival documents with regard to their formation, forms, and effects.

602. (1½) *Elements of Law for Archivists.*—Structure of the Canadian legal system. Legislative jurisdictions and legislative process. Legal principles and procedures governing the creation and use of documents in public and private law.

605. (1½) *Archival Information Retrieval.*—Application of the principles of subject analysis, specification, and control to the arrangement and description of archives. Special emphasis on automated systems for information retrieval from archives.

610. (1½) *Preventive Conservation.*—Administration of programs of conservation and preservation of archival materials. Environmental and biological causes of deterioration and methods of combatting them. Practical experience of basic preventive conservation techniques (examination, documentation, testing, cleaning, fumigation, mending and binding).

611. (1½) *Specialized Archives.*—Administration of archives serving specialized institutions, or of archival collections specialized according to medium or to theme. Topics will vary from year to year.

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 program of reading under faculty direction.

620. (6) *Thesis.*

Art Education (ARTE)

(Faculty of Education)

303. (3) *Ceramics in Art Education.*—Exploration of ceramic techniques, including hand building and basic throwing. Prerequisite: Fine Arts 181 and 3 units of art history. [1-3; 1-3]

305. (3) *Design in Art Education.*—Exploration of design, particularly in relation to textiles. Prerequisites: Fine Arts 181 and 3 units of art history. [1-3; 1-3]

314. (2) *Curriculum and Instruction in Art: Secondary.*—Curriculum organization in art; principles and methods of instruction applied to teaching art. Prerequisite: a completed concentration in art or permission of the Head; co-requisite Education 311. [2-4; 0-0]

320. (1) *Curriculum and Instruction in Art: Elementary.*—Curriculum organization in art; principles and methods of instruction applied to teaching art. Prerequisite: Education 310. [0-0; 1-2]

321. (1½) *Microcomputers in Art and Music Education.*—Experience with computer graphics and music hardware and software in a model studio setting. Lectures, tutorials, and studio work. (Same course as Music Education 321.) [1-4; 0-0] or [0-0; 1-4]

322. (1½) *Multimedia Production using Computer Graphics and Midi-controlled Synthesizers.*—Application of skills and experience with digital equipment and software to a creative project exploring relationships between musical and visual media. Studio work. (Same course as Music Education 322.) Prerequisite: Art Education 321. [1-4; 0-0] or [0-0; 1-4]

400. (1-6)**d** *Studies in an Art Education Studio Area.*—Directed studies in an area relevant to teaching in an elementary or secondary school. Offered in ceramics, drawing and painting, graphics, sculpture, textiles, and photography. Prerequisite: 9 units of Art Education or Fine Arts studio courses.

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]

425. (1½) *Explorations in the Teaching of Art to Children.*—A laboratory-based art education course in which students work with elementary aged children. Prerequisite: Art Education 314 or 320. [0-0; 1-3] or [1-3; 0-0]

441. (1½) *Art Education Theory and Research.*—Art Education theory and research is studied relative to school practice. Prerequisites: Art Education as a major or minor field and completion of a practicum in Art Education. [3-0; 0-0] or [0-0; 3-0]

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 One—See Faculty of Arts.

Asian Studies
(Faculty of Arts)

Asian Languages (ASLA)

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 the Department for details. [3-1; 3-1]

400. (3) *Studies in an Asian Language, (Intermediate Course).*—Prerequisite: Asian Languages 300 or permission of the instructor. [3-1; 3-1]

Asian Studies (ASIA)

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 Anthropology 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. [2-1; 2-1]

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. [3-0; 3-0]

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]

322. (3) *History of Korean Civilization.*—The evolution of a distinctive Korean civilization within the East Asian cultural sphere. Primary focus on cultural, social, and political developments from the earliest times to the nineteenth century. [3-0; 3-0]

324. (1½) *Contemporary Korean Culture.*—An introduction to the literature, drama, music, and art of Korea today. Particular attention will be paid to the continuing influence of traditional themes and forms. No prerequisites. [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 the cultural context. Same as Philosophy 323. [3-0; 3-0]

327. (1½) *History of Korean Thought.*—An examination of Korean religious, philosophical, and scientific thought from the earliest written records to the present day, with particular focus on the interaction of Shamanism, Buddhism, Confucianism, and, in the present century, Christianity. No prerequisites. [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]

347. (3) *Performance Traditions of South Asia.*—Classical and folk forms of music, dance, theatre, and cinema in their literary, religious, and social contexts. [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]

360. (3) *The Making of the Sikh Tradition.*—A historical study of the social and cultural forces that helped shape Sikh religious beliefs and ritual practices over the past four centuries. In dealing with the evolution of Sikh identity, due attention will be given to Sikh ideals, social organization, religious institutions, and sacred literature. [3-0; 3-0]

362. (3) *History of Indonesian Civilization.*—A historical survey of the Indonesian archipelago from the twelfth century to the present. Attention will be given to the rise of commercial cities, the development of bureaucratic states, and the elaboration of major religions, all of which bridged the cultural diversity of the islands. In the second term the emphasis will be on twentieth century Indonesia. [3-0; 3-0]

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 as Religious 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 Religious Studies 366.) [0-0; 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 the 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 424. [2-1; 2-1]

420. (3) *Contemporary South Asia.*—Problems of modernization and external relations of India, Pakistan, Bangladesh, and Sri Lanka since 1947. [3-0; 3-0]

422. (3) *Modern Japanese History since 1800.*—Same as History 422. [3-0; 3-0]

423. (1½/3)**d** *Individualism in Modern Japan.*—The individual in conflict with tradition and the state in the late nineteenth and twentieth centuries. [3-0] or [3-0; 3-0]

434. (3) *History of Southeast Asia since 1800.*—Same as History 434. [3-0; 3-0]

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]

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 eighteenth century. Same as History 482. [3-0; 3-0]

480. (3) *Economic and Social History of Modern China to 1949.*—Same as History 480. [3-0; 3-0]

Note: Courses with a maximum of 9 units may not be taken for more than 3 units in any one topic.

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. (1½-9)**d** *Studies in Chinese Paleography.*

508. (1½-9)**d** *Topics in Pre-modern Chinese History and Institutions.*

509. (1½-9)**d** *Aspects of Chinese Popular Thought and Religion.*

511. (1½/9)**d** *Readings in Chinese Religious Texts.*—Selected readings from primary texts in Confucianism, Taoism and Buddhism, and popular religion. Prerequisite: Chinese 301 or equivalent. (Same course as Religious Studies 511.) [3-0; 3-0]

512. (1½-9)**d** *Advanced Readings in Classical Chinese.*—Prerequisite: Chinese 400 or equivalent.

513. (1½/3)**d** *Topics in Classical Chinese Literature.*

514. (1½-9)**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. (1½-9)**d** *Topics in the History and Structure of the Japanese Language.*

528. (1½-9)**d** *Problems of Japanese Intellectual History.*

532. (1½-9)**d** *Topics in Traditional Japanese Literature.*

533. (1½-9)**d** *Topics in Modern Japanese Literature.*

541. (1½-9)**d** *Research Methods and Source Materials in South Asian Studies.*

543. (1½-9)**d** *Topics in the History and Structure of Indian Languages.*

546. (1½-9)**d** *Topics in South Asian Literature.*

550. (1½-9)**d** *Topics in Early South Asian Civilizations.*

561. (1½-9)**d** *Problems of Modernization in Eastern and Southern Asia.*

570. (1½/3)**d** *Approaches to Asian Literature.*

581. (1½-9)**d** *Research and Source Materials in Korean Studies.*

599. (3/6)**c** *Master's Thesis.*

699. *Ph.D. Thesis* (in Chinese, Japanese, or South Asian Studies only).

Chinese (CHIN)

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 and 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 and 201. Prerequisite: Chinese 100 and 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 the 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 and 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 the 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 the 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 the 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 the 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 and Asian Studies 302, or equivalent knowledge of Chinese literature and history. [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. (1½-9)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.

Japanese (JAPN)

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, or 180, or equivalent. [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, or 180, or equivalent. [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 180, 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 102 and 103, or 180, 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 these 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. Prerequisite: Japanese 300 and 301 or equivalents. [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 permission of the instructor. [3-0; 3-0]
440. (1½-9)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.

Korean (KORN)

102. (3) *Basic Korean.*—An introduction to the grammar and syntax of modern spoken and written Korean. [3-1; 3-1]
200. (3) *Intermediate Korean.*—Reading and writing of modern colloquial Korean at an intermediate level. Prerequisite: Korean 102 or its equivalent. [3-1; 3-1]
300. (3) *Readings in Korean Topics.*—Readings in mixed script on aspects of Korean culture, customs, and contemporary life, along with structured conversations based on those readings. Prerequisite: Korean 200 or equivalent. [3-0; 3-0]

South Asian Languages:
Hindi (HIND)

102. (3) *Introductory Hindi.*—An introduction to spoken and written Hindi. [3-1; 3-1]
110. (3) *Accelerated Hindi.*—For students with knowledge of another North Indian language before entering the University. Equivalent to Hindi 102 and 200. Prerequisite: permission of the instructor. [3-0; 3-0]
200. (3) *Intermediate Hindi.*—Further study of the grammar and introduction to the literature of Hindi. Prerequisite: Hindi 102 or permission of the instructor. Not open to students who have taken Hindi 110. [3-1; 3-1]
405. (3) *Medieval Hindi.*—Introduction to medieval Hindi grammar, and readings in medieval poetry (Tulsidas, Surdas, Kabir, etc.). Prerequisite: Hindi 200 or Hindi 110. [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 200 or Hindi 110. [3-0; 3-0]

Indonesian (INDO)

102. (3) *Introductory Indonesian.*—Spoken and written Indonesian. [3-1; 3-1]
200. (3) *Intermediate Indonesian.*—Study of the grammar and introduction to Indonesian literature. Prerequisite: Indonesian 102 or equivalent. [3-1; 3-1]

Punjabi (PUNJ)

102. (3) *Introductory Punjabi.*—Spoken and written Punjabi. [3-1; 3-1]
200. (3) *Intermediate Punjabi.*—Study of the grammar and introduction to the literature of Punjabi. Prerequisite: Punjabi 102 or equivalent. [3-1; 3-1]

Sanskrit (SANS)

102. (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]
200. (3) *Intermediate Sanskrit.*—Advanced grammar and selected readings. Prerequisite: Sanskrit 102. [3-0; 3-0]
300. (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 200. [3-0; 3-0]

Urdu (URDU)

401. (3) *Readings in Urdu.*—Introduction to Urdu script, and readings in Urdu prose and poetry. Prerequisite: Hindi 200 or Hindi 110. [3-0; 3-0]

South Asian Languages (SOAL)

440. (1½-9)c *Supervised Study in South Asian Languages.*

Southeast Asian Languages (SEAL)

440. (1½-9)c *Supervised Study in Southeast Asian Languages.*

Astronomy (ASTR)
(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. [0-0; 3-0]

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. [3-0; 0-0]

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. This 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. Prerequisite: 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.*

Atmospheric Science (ATSC)
(Faculty of Science)

200. (1½) *The Atmosphere.*—An introduction to the atmospheric variables and the processes governing their distributions. Atmospheric energy, moisture and motion on all scales (micro to planetary). Prerequisite: GEOG 101 or the first year of a B.Sc. degree. (Same as GEOG 200.) Credit will be given for only one of ATSC 200, GEOG 200, 204, or 202 (or 214 prior to September 1988). [3-2; 0-0]

300. (1½) *Weather and Climate.*—Application of meteorological principles to the study of weather and climate on all scales. Air masses, fronts, upper air waves and their influence on surface weather. Mesoscale circulations and regional climate. Local and microclimates. Climates of Canada. Climatic change. Prerequisite: GEOG 101 or GEOG/ATSC 200. (Same as GEOG 300.) [0-0; 3-0]

301. (1½) *Atmospheric Energetics.*—Radiative transfer and thermodynamic theory applied to the Earth-Atmosphere system. Exchanges of short and long-wave radiation between the atmosphere and the surface. Behaviour of dry and moist air. Static stability, mixing and thermodynamic diagrams. Prerequisite: ATSC/GEOG 200 or one of PHYS 156, 213, GEOP 221. (Same as GEOG 301.) [3-0-2; 0-0-0]

302. (1½) *Atmospheric Phenomena.*—Physical basis of cloud, precipitation and other atmospheric phenomena. Cloud dynamics and microphysics. Processes of droplet/ice particle growth producing precipitation. Severe weather. Atmospheric electricity, optics and acoustics. Prerequisite: ATSC/GEOG 301 or a 200 level course in PHYS or GEOP. (Same as GEOG 302.) [0-0; 3-0]

303. (1½) *Methods in Atmospheric Science.*—An introduction to instrumentation used in monitoring the state of the atmosphere; a brief survey of methods of analysis of meteorological data. Prerequisite: ATSC/GEOG 200; CPSC 111. (Same as GEOG 303.) Credit may not be obtained for both this course and its predecessor GEOG 409. [0-0; 2-2]

411. (1½) *Atmospheric Dynamics.*—Applications of dynamical principles to motions in the atmosphere. Topics include the planetary boundary layer, synoptic-scale motions, cyclogenesis, convection and the general circulation, and numerical weather prediction. Prerequisite: PHYS 312 or MATH 316, and ATSC/GEOG 200 and 301. (Same as OCGY 411.) [0-0; 3-0]

414. (1½) *Geophysical Fluid Dynamics.*—The fundamental principles governing the flow of a density-stratified fluid on a rotating planet, with applications to the motions of the ocean and the atmosphere. Prerequisite: PHYS 312 or MATH 316. (Same as OCGY 414.) [3-0; 0-0]

440. (1½) *Synoptic Meteorology.*—Introduction to meteorological analysis. Diagnosis of weather systems including their motion and development. Observing systems and chart analysis, cross-sectional and diagnostic analysis of synoptic systems. Emphasis on practical tutorial-laboratory exercises. Prerequisite: ATSC/GEOG 200 and 300. (Credit may not be obtained for both this course and GEOG 302 prior to September 1988.) [1-3; 0-0]

441. (1½) *Contemporary Developments in Synoptic Meteorology.*—Satellite and computer aided analysis and prognosis of synoptic systems. Prognosis of weather systems including their motion and development. Objective analysis, numerical weather prediction, forecasting techniques and forecast verification. Emphasis on practical laboratory exercises. Prerequisite: ATSC/GEOG 200 and 300. [0-0; 1-3]

442. (1½) *Weather Seminar.*—Analysis and discussion of the synoptic and local weather for the preceding and forthcoming weeks using surface and upper air charts and satellite imagery. Students share the responsibility for attending weather briefings at the Vancouver Weather Office, preparing charts and leading the discussion. Prerequisite: ATSC/GEOG 200 and 300 or permission of the Chairman. (Credit may not be obtained for both this course and GEOG 303 prior to September 1988.) [0-2-1; 0-0-0] or [0-0-0; 0-2-1]

449. (3) *Honours Project.*—Honours students must submit a graduating report based on a project undertaken with the approval of the Chairman of the Atmospheric Science Program.

Audiology and Speech Sciences (AUDI)
(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.

512. (1½) *Sensory Physiology: Hearing and Vision.*—A lecture and seminar course intended as a research guide for students in science and medicine. Offered in even numbered years. Prerequisite: Physiology 425 or equivalent. (Same as Physiology 531)

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 (BIOC)
(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 or 230 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 plus Biochemistry 302 or 303 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. (1½) *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; 2-0]

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 Biology 335. 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. (1½/3)c *Directed Studies in Biochemistry.*—A library (1½ units) or a laboratory project with written report (1½ or 3 units) allowing a student to undertake an investigation on a specific topic as agreed upon by the faculty and student. Permission of the 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, translation, gene organization, gene expression. Credit will not be given for both BIOC 303 and 503. [0-0; 3-0]

509. (2) *Biochemistry of Membranes.*—Lectures and discussions on the biochemistry of membrane lipids and proteins, the structure and assembly of membranes, the respiratory chain and electron transport, photophosphorylation and transport across membranes. 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) *Biochemical Aspects of Cellular Regulation.*—A lecture and discussion course on the molecular basis of cellular regulation with special emphasis on mammalian cells. Mechanisms involved in the responses of cells to adrenergic, steroid and peptide hormones and growth factors. Regulation of the concentration and specific activity of key enzymes, transport systems and structural proteins. Given in alternate years.

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 (BIOL)
(Faculty of Science)

Note: The following Biology courses have been renumbered (old numbers in brackets): (302) 333, (310) 344, (311) 345, (313) 346, (315) 332, (321) 302, (322) 303, (323) 304, (330) 350, (335) 336, (336) 335, (340) 330, (422) 400.

In addition, all undergraduate courses in Botany and Zoology have been transferred to Biology (see headings for **Botany** and **Zoology** for specific changes).

Note: Biology 101 or 102 or 103 (or equivalent) is prerequisite to all Biology courses, except Biology 153, 343, 344, 345, 346, and 446.

Primarily for First Year Students

Biology 101, Biology 102, or Biology 103 is a prerequisite for admission to Major or Honours programs in the Life Sciences Departments. Any one of these courses will meet the First Year Biology requirements 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 each of these three introductory courses, BIOL 101, BIOL 102 and BIOL 103, is accepted as a prerequisite to further courses in Biology, credit may be obtained for only one. However, each course is open only to those students who have completed the requirements specified.

**Additional fees are charged for these courses. See Index "Fees—Special Fees".

101. (3) *Principles of Biology.*—Open only to students who have not received credit for Biology 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]

102. (3) *Principles of Biology.*—Open only to students who have received credit for Biology 12, or the equivalent. An introductory course emphasizing principles of wide application to all living organisms, including adaptation to the environment, the mechanism of inheritance, and evolution. A comparative approach to the unity and diversity of organisms will be stressed. [3-3*; 3-3*]

103. (3) *Principles of Biology.*—An enriched introductory course open only to students who have received an A grade in Biology 12, or the equivalent. Principles of wide application to all living organisms, including adaptation to the environment, the mechanism of inheritance, and evolution. A comparative approach to the unity and diversity of organisms will be stressed. [3-3*; 3-3*]

153. (3) *Human Biology.*—The principles of biology with particular reference to the human body. Laboratories will include an examination of fundamental tissues and selected experiments on organ physiology. Open only to students in the School of Nursing. BIOL 101 or 102 or 103 is not a prerequisite. [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 or 103. [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 or 103, 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]

204. (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]

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]

300. (1½) *Biometrics.*—Introduction to statistical procedures for biological research. Topics include estimation, hypothesis testing, goodness of fit, analysis of variance, and regression. The laboratory introduces computers and their use in graphical and statistical analysis. Prerequisites: Mathematics 100 and 101, and third year standing. Credit will be given for only one of Biology 300 and Plant Science 321. [3-2; 0-0] or [0-0; 3-2]

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) *Community and Ecosystem Biology.*— Introduction to the principles of ecology at the community and ecosystem levels of integration. Topics include community structure and dynamics, productivity, decomposition, and mineral cycling. Prerequisite: BIOL 303 is strongly recommended. [0-0-0; 3-0-1*]

303. (1½) *Population Biology.*—Introduction to the study of plant and animal populations and their physical and biological environments. Topics include natural selection and microevolution, demography, population dynamics, competition and predation. [3-0-1*; 0-0-0]

305. (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. Co-requisite: BIOL 302 or equivalent, or permission of Head of Zoology. BIOL 305 and OCGY 316 are the same course. [2-0-1; 0-0-0]

310. (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 Biology 410). Prerequisite: completion of second year Biology or permission of Head of Zoology. [3-0-2; 0-0-0]

320. (1½) *Survey of Algae.*—A survey of the algae, considering their morphology, life history, classification, and ecology. [0-0; 3-3]

321. (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]

322. (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]

323. (1½) *Structure and Reproduction of Fungi.*—A systematic survey of slime molds and fungi. [2-3; 0-0]

324. (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]

325. (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]

**326. (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: BIOL 205. Primarily for students in Third or Fourth Year. [2-3; 0-0]

327. (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]

**328. (3) *Introductory Parasitology.*—Classification, morphology, life histories of animal parasites affecting domestic and wild animals and man. [2-3; 2-3]

330. (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. Prerequisite: BIOL 200. [0-0; 3-3]

331. (1½) *Developmental Biology.*—Animal development and its underlying causal principles; introductory embryology. Prerequisites: Biology 200, 201. Biochemistry 300 or 302 or 303 is recommended. [3-3; 0-0]

332. (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. Prerequisite: BIOL 200. [2-3; 2-3]

333. (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. Prerequisite: BIOL 200. [2-3; 0-0]

334. (1½) *Genetics I.*—First of an integrated pair of courses stressing fundamentals of Mendelian genetics, chromosome theory of inheritance, linkage, mutation, Hardy-Weinberg equilibrium, and inheritance and gene regulation in prokaryotes. Credit will be granted for only one of Biology 334 and Agricultural Sciences 213 or Forestry 302. Prerequisite: Biology 200 and 201; Chemistry 230 or 203. [3-0-2; 0-0-0]

335. (1½) *Genetics II.*—Second of an integrated pair of courses emphasizing fundamentals of eukaryotic gene regulation and genome organization, organelle genetics, transposons, mechanisms of mutation, recombination and DNA repair, as well as the fundamentals of developmental genetics. Prerequisite: Biology 334. (This course is the same as MICB 325.) [0-0-0; 3-0-2]

337. (1½) *Introductory Genetics Laboratory.*—A laboratory course demonstrating the fundamental principles of inheritance utilizing primarily *Drosophila, Paramecium* and the freeliving 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]

343. (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]

344. (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 BIOL 101/102/103 or BIOL 344. Not open to students in Departments of the Life Sciences. [3-0-2; 0-0-0] or [0-0-0; 3-0-2]

345. (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]

346. (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 346. Not open to students in Departments of the Life Sciences. [3-0; 0-0]

347. (1½) *Principles and Methodology in Biological Research I.*—Contemporary research in the Botany and Zoology Departments; history and methodology of scientific discovery; seminars on current problems. Restricted to Honours students in Biology. Not to be taken concurrently with BIOL 449. [2-3; 0-0] or [0-0; 2-3]

350. (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]

351. (1½) *Plant Physiology I: Plant Nutrition.*—Introduction to the basic processes involved in plant nutrition. Topics include water relations, photosynthesis, acquisition and translocation of inorganic nutrients and phloem translocation. CHEM 230 is strongly recommended. Credit can be obtained for only one of BIOL 351 and PLNT 324. [2-3-1; 0-0-0]

352. (1½) *Plant Physiology II: Plant Development.*—Introduction to the processes involved in growth and development. Topics include cell division, tissue culture, meristems, differentiation, and the modes of action of major plant growth regulators. CHEM 230 is strongly recommended. Credit can be obtained for only one of BIOL 352 and PLNT 325. [0-0-0; 2-3-1]

353. (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 Zoology. Credit will be allowed for one only of BIOL 353 or PHYL 301. [3-3*; 3-3*]

354. (1½) *Comparative Environmental Physiology.*—A survey of physiological adaptations of animals to different environments. Pre- or co-requisite: BIOL 353, or PHYL 301, or permission of Head of Zoology. [0-0; 3-0]

400. (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 and Microbiology 400.) [0-0; 2-4]

401. (1½) *Ecology of Fungi.*—Environmental requirements of fungi, their role in various ecosystems, and their relationships with other organisms in the habitat. Prerequisite: BIOL 323. [0-0; 2-3]

402. (1½) *Aquatic Ecology I.*—Theoretical and applied aspects of limnology. Consideration of the ecology of inland water organisms in relation to physical, chemical and biological factors affecting their interactions and production. One weekend field trip required. Prerequisites: BIOL 300, 302 and 303, or permission of the Head of Zoology. [2-4; 0-0]

403. (1½) *Aquatic Ecology II.*—A practical course in analytical techniques and field operations as used in biological oceanography. Pre- or co-requisite: BIOL 305/OCGY 316 or permission of the Head of Zoology. BIOL 403 and OCGY 406 are the same course. [0-0-0; 1-4-1]

404. (3) *Ecological Methodology.*—Quantitative methods for estimating population density, sampling problems of field populations, and experimental design in ecological analysis. Application of computer techniques for the statistical analysis of ecological data. Prerequisites: BIOL 300, 302 and 303. [2-4; 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: BIOL 205, BIOL 320, BIOL 300 (may be concurrent), BIOL 302; or their equivalents. [0-0; 2-3]

406. (1½) *Plant Ecology I.*—Plant community ecology including a consideration of the major approaches to sampling, analyzing and interpreting vegetation patterns. Instruction given in field work and computer analysis of field data. Prerequisite: BIOL 302; BIOL 324 is recommended. [3-3; 0-0]

407. (1½) *Plant Ecology II.*—Relationships between plants and their physical and biotic environment, including plant population dynamics, genecology, ecology of reproduction and vegetation change. Students will carry out a short term project in the laboratory or field. Prerequisites: BIOL 302 and 303. [0-0; 3-3]

408. (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. Prerequisite: BIOL 300. [2-2; 2-2]

**409. (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. Preregistration is required. Prerequisites: BIOL 302 and 303, and BIOL 300. BIOL 310 is recommended.

410. (1½) *Animal Behaviour Seminar.*—Lectures in experimental design and non-parametric statistics; an experimental project of the student's choice; group seminars on selected topics in animal behaviour. Prerequisite: BIOL 310. [0-0; 2-3]

411. (1½) *Insect Ecology.*—Behavioral, population and community ecology of insects. Interactions between insects and plants and the application of the principles of insect ecology to biological control of insects and weeds. (Same as Plant Science 431.) Prerequisite: BIOL 205 or PLNT 331. [3-0; 0-0]

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) *Zoogeography.*—Distribution of terrestrial and aquatic animals in space and time; restricted to students in Third and Fourth year. [0-0; 3-0]

414. (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 in Biology or permission of Head of Zoology. [0-0; 3-0]

415. (1½) *Evolutionary Processes in Plants.*—Experimental and comparative analysis of evolutionary processes, speciation, and phylogenetic patterns in plants. Prerequisite: BIOL 334. [0-0; 3-0]

420. (1½) *Plant Anatomy.*—Internal structure, organization and development of vascular plants from both theoretical and descriptive perspectives. Emphasis is on conifers and angiosperms. Prerequisite: BIOL 210, BIOL 333, or permission of the Head of Botany. [0-0; 2-3]

421. (1½) *Paleobotany.*—A study of fossil plants, emphasizing structure, evolution, and paleoecology. Prerequisite: Biology 210 or equivalent. Given in alternate years. [2-3; 0-0]

422. (1½) *Palynology.*—A study of plant microfossils emphasizing their nature, distribution, recovery, and application to paleoecology. Given in alternate years. [2-3; 0-0]

424. (1½) *Advanced Seed Plant Taxonomy.*—Current classification systems and the evidence on which they are based. This course emphasizes the angiosperms. Given in alternate years. Prerequisite: BIOL 324 or equivalent. [0-0; 2-3]

425. (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: BIOL 325. [0-0; 2-3]

**426. (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: BIOL 204. [2-3; 2-3]

**427. (3) *Terrestrial Vertebrate Zoology.*—The natural history and behavioral ecology of terrestrial vertebrates. The laboratory includes classification, life histories, and ecology of terrestrial vertebrates, with particular attention to British Columbia. Prerequisite: BIOL 204. [2-3; 2-3]

**428. (1½) *Invertebrate Aquaculture.*—The theory and practice of culturing selected commercially important invertebrates. Prerequisite: BIOL 326. [2-3; 0-0]

429. (1½) *Algal Aquaculture.*—The theory and practice of growing micro- and macroalgae for commercial purposes. Includes historical aspects of algal aquaculture, cultivation principles, practical problems, end products, economics and current status of the industry. [3-0; 0-0]

430. (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: BIOL 331. Pre-or corequisite: BIOC 300 or 302 or 303. [0-0-0; 2-3-1]

431. (3) *Eukaryotic Developmental Genetics.*—An advanced coverage of the following topics: organization of chromosomes, developmental control of gene expression, epigenetic determination and differentiation; control of growth; experimental partitioning of the influences of maternal and zygotic genetic factors in the regulation of development; establishment of axial systems and pattern formation. Prerequisites: BIOL 335 and one of BIOC 300, 302, or 303. BIOL 331 is recommended. [3-0; 3-0]

432. (1½) *Advanced Problems in Animal Genetics.*—A study of advanced problems and concepts on topics such as chromosome mechanics, genetic fine structure analysis, gene conversion, mutagenesis and hybrid dysgenesis. Prerequisite: BIOL 335. [2-4; 0-0]

433. (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. Prerequisite: BIOL 335. [3-0-1; 0-0-0]

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 or Forestry 302, or equivalent. (Biology 434/Medical Genetics 434 are the same course.) [0-0; 3-0]

435. (1½) *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: Third year standing in Life Sciences. BIOL 332 suggested. Offered in alternate years. [0-0-0; 2-3-1]

436. (1½) *Fundamentals of Cytogenetics.*—A detailed consideration of the nucleus and chromosomes as the physical basis for heredity. Prerequisite: Biology 335, or equivalent. [0-0; 2-3]

437. (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 Biology 431 and it is recommended that the two courses be taken concurrently. Prerequisites: BIOL 331, BIOL 335, and one of either BIOL 201 and BIOC 302 or 303, or BIOC 300. [0-0-0; 0-6-1]

439. (3) *Plant Biochemistry.*—A comparative survey of intermediary metabolism, including the chemistry, biosynthesis, distribution and biological function of organic compounds in the plant kingdom. Prerequisites: CHEM 203 (or 230) and either BIOL 201 or BIOC 300. [2-3; 2-3]

440. (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: BIOL 333. [1-4; 0-0]

441. (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]

444. (1½) *Techniques in Plant Molecular Biology.*—A laboratory course that includes techniques in purification and analysis of plant nucleic acids, electrophoresis and immunodetection of plant proteins. Offered by the Biotechnology Laboratory Teaching Laboratory in cooperation with the Department of Botany. Restricted to Honours students with permission of the Head of Department. Prerequisite: BIOL 335. Recommended co-requisite: BIOL 433. [0-7]

445. (1½) *Bio-analysis.*—The modeling and analysis of biological processes and experimental data using computers. Consideration of the modeling of animal population characteristics; modeling and analysis of transport processes in physiology, reduction and analysis of biological data, including spectral composition analysis, image analysis and analysis of instrumentation dynamic response characteristics. Prerequisite: BIOL 301. [2-3; 0-0]

446. (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]

447. (1½) *Principles and Methodology in Biological Research II.*—Seminars, debates, workshops and tutorials designed to produce competence in specific areas of Biology. Restricted to Honours students in Biology. Must be taken concurrently with BIOL 449. [2-3; 0-0] or [0-0; 2-3]

448. (1½-6)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 member and the student. Permission of the Head of Botany or Zoology, and the supervisor required. No more than three units of Biology 448 may be taken with the same superviser.

449. (3) *Directed Biological Research.*—A course designed to allow students to undertake a research project in selected fields. Open only to Honours students in Biology, after consultation with the Head of Botany or Zoology, and with permission of the superviser. Presentation of a thesis and an oral examination are required. Must be taken concurrently with BIOL 447.

450. (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. Prerequisites: Biochemistry 300, 302 or 303; Biology 454 recommended. [0-0; 3-0]

451. (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: BIOL 320 and one of BIOL 350 or 351 (may be taken concurrently). (Same as OCGY 415.) [0-0; 2-3]

452. (1½) *Plant Development.*—Molecular mechanisms involved in organ and cell differentiation, the molecular basis for plant hormone action, developmental genetics of plants, and light effects on development. The course will emphasize the biotechnological methodologies responsible for recent advances in understanding developmental processes. Prerequisite: BIOL 201 and either BIOL 351 and 352, or PLNT 324 and 325. [2-3; 0-0]

453. (1½/3)c *Animal Physiology Laboratory.*—Experiments in animal physiology using computer data acquisition and analysis. For 1½ units, students must complete 5 experiments; for 3 units, students must complete 10 experiments. Prerequisite: BIOL 353. Corequisite: one of BIOL 354, 450, 454, 455 or 456, or permission of the Head of Zoology. [0-6; 0-6]

454. (1½) *Animal Comparative Physiology.*—Selected topics in physiology emphasizing comparisons between diverse phylogenetic groups of animals. Prerequisite: Biology 353, Physiology 301, Psychology 360, or Biology 350. [0-0; 3-0]

455. (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: Biology 353, Physiology 301, Psychology 360, or Biology 350. [3-0-2*; 0-0-0]

456. (1½) *Comparative Endocrinology.*—A comparative study of vertebrate and invertebrate endocrinology. Prerequisite: BIOL 353 or PHYL 301, or permission of the Head of Zoology. [0-0; 3-0]

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, Biology 454, 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 (BIOE)

(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]

255. (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*]

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. (For non-engineering students.) [3-2-0; 0-0-0]

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 (1).*—Units and dimensions, mass balance, steady state and transient heat flow, thermodynamics, fluid flow, fluid handling and measurement. (For non-engineering students.) [2-2-0; 0-0-0]

303. (1½) *Introduction to Feed Technology.*—Introduction to unit operations of feed technology. Physical and nutritional properties of feed and ingredients in relation to processing. Unit operations: size reduction (grinding, rolling), mechanical sorting, sifting and separation, mixing of solids, pelletizing and cubing, weighing and metering, cooling and drying. Conveying, handling and transportation systems. Process evaluation and quality control. [2-2*-2*; 0-0-0]

306. (1½) *Functional Design of Aquacultural Operations.*—Overview of the status of aquaculture and its justification. Aquacultural production operations functional specifications for performance and reliability. Review of selected examples of production systems. Facility functional design using the techniques of systems analysis. An individual student project is required. Not restricted to Applied Science students. Field trip. [2-2*-2*; 0-0-0]

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. (For non-engineering students.) [2-2-0; 0-0-0]

361. (1½) *Soil and Water Engineering*.—An introduction to the fundamental principles 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 of 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]

390. (1½) *Biomass Conversion and Utilization*.—Methods of handling and treating wastes from the food production and processing industries. [2-2*-2*; 0-0-0]

403. (1½) *Advanced Feed Technology*.—Handling, conveying and storage systems. Liquid feed processing and handling. Flow characteristics in bins and flow through orifices. Extrusion operation and systems. Process flow design. Feed plant layout and automation. Systems integration. Dust control filtering and exhausting systems. Explosion and fire prevention. [0-0-0; 2-2*-2*]

456. (1½) *Design of Closed Environments*.—Dynamic energy balances, natural and forced ventilation design, solar radiation control and utilization. Greenhouse heating and cooling using conventional and alternate energy sources. Control systems and lighting design. Prerequisites: BIOE 366 and BIOE 376. [2-0-2; 0-0-0]

464. (1½) *Irrigation and Drainage Engineering*.—Drainage and irrigation design criteria development; design of drainage and irrigation systems; computer aided design and drafting; construction and maintenance of water management systems. Prerequisites: BIOE 361, CIVL 215. [0-0-0; 2-2*-2*]

471. (1½) *Systems Design 1*.—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. Prerequisite: BIOE 285. [2-2*-2*; 0-0-0]

472. (1½) *Materials Handling Methods*.—Design and selection of materials handling equipment and devices useful for the secondary production systems for handling, processing and storage of food, feed, and fibre. Emphasis on individual initiative and application of fundamentals. Term design project. Prerequisites: BIOE 285, BIOE 471. [0-0-0; 2-2*-2*]

480. (1½) *Food Process Engineering*.—A study of the unit operations pertaining to processing of food and agricultural materials. Cleaning, sorting, grading, size reduction, heating, cooling, freezing, drying and storage. Prerequisite: BIOE 376. [2-0-2; 0-0-0]

481. (1½) *Food Engineering*.—Heating, cooling and freezing of food materials. Heat exchange devices. Diffusional operations, physical separations. Storage stability. Prerequisite: BIOE 480. [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*]

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 mulitrophic 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) *Advanced 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 (BOTA)

(Faculty of Science)

All undergraduate courses in BOTANY are listed under BIOLOGY. The following courses have been renumbered and transferred to BIOLOGY (old Botany numbers are shown in brackets): (301) 320, (306) 321, (307) 322, (308) 323, (310) 343, (311) 324, (330) 351/352, (402) 420, (409) 401, (413) 424, (415) 451, (426) 406, (427) 407, (430) 452, (435) 439, (437) 433, (441) 421, (442) 422.

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*.

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 324.

510. (3) *Advanced Marine Phycology*.—Collection, identification, ecology and life histories of algae; emphasis on marine benthonic forms. Prerequisite: Biology 320.

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.

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: Biology 407 (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, amd 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 alternate years). (This course is the same as Plant Science 538).

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.

544. (1½) *Plant Molecular Biology Laboratory.*—Techniques of purification, cloning, sequencing, restriction-hybridization analysis of plant nucleic acids, in-vitro labelling of plant nucleic acids and proteins, and electrophoresis and immunodetection of plant proteins. Offered by the Biotechnology Teaching Laboratory in co-operation with the Department of Botany. Admission to the course is limited and requires recommendation from the Head of Botany or the Director of the Biotechnology Laboratory. Recommended pre- or co-requisite: BIOL 335. Same as PLNT 540 and FRST 503.

546. (1-6)c *Topics in Botany.*

549. (3/6)c *Master's Thesis.*

649. *Ph.D. Thesis.*

Business Education (BUED)

(Faculty of Education)

314. (2) *Curriculum and Instruction in Business Education: Secondary.*—Curriculum organization in business education; principles and methods of instruction applied to teaching business education. Prerequisite: a completed concentration in business education or permission of the Head; co-requisite Education 311. [2-4; 0-0]

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. Pre- or co-requisite: Business Education 401. [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. [4-0; 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; 4-0]

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. Corequisite: 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 Canadian Studies under Programs in the Faculty of Arts.

Chemical Engineering (CHML)

(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. Prerequisite: CHML 241 [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. Prerequisite: PHYS 170. Corequisite: MATH 254. [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. (1) *Diffusional Operations I.*—Principles and design of equipment for equilibrium and non-equilibrium, stagewise separation by distillation, absorption, adsorption, extraction, etc. for binary and multicomponent systems using analytical, graphical and numerical methods. Prerequisite: CHML 241. [0-0-0; 3-0-2*]

345. (1) *Applied Thermodynamics I.*—Basic 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. Prerequisites: CHEM 251, PHYS 153. [2-0-2*; 0-0-0]

346. (1) *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. Prerequisite: CHML 345. [0-0-0; 2-0-2*]

351. (1½) *Transport Phenomena II.*—Heat and mass transfer; conduction and molecular diffusion; thermal and dilute material, convective transfer; thermal radiation; analogies between momentum, heat and mass transfer; prediction of transfer rates; heat exchanger design. Prerequisite: CHML 251. [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. Prerequisites: CHML 242, CHML 251. [2-0-2*; 0-0-0]

356. (1½) *Process Control.*—Theory and application of automatic control in chemical processes; process dynamics; instrumentation. Prerequisite: MATH 255. [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. Prerequisite: CHEM 251. [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. Prerequisite: CHML 345. [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. Prerequisite: CHML 242. [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. A major field trip is required with expenses to be borne by students. Prerequisites: CHML 251, CHML 261. Corequisite: CHML 353. [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. Prerequisites: CHML 251, CHML 261. Corequisite: CHML 353. [0-0-0; 0-3-0]

442. (1½) *Diffusional Operations II.*—Principles and equipment design for continuous-contact mass transfer operations including distillation, extraction, drying, humidification, etc. Prerequisites: CHML 341, CHML 351. [3-0-2*; 0-0-0]

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. Prerequisites: CHML 341, 346, 351, 353, 356 and 359. Corequisite: CHML 358. [0-0-2; 0-0-2]

455. (3) *Chemical Engineering Reactor Design.*—Chemical reaction kinetics, catalytic processes, and reactor design. Prerequisites: CHEM 252, CHML 351. [2-0-0; 2-4-0]

457. (1) *Process Synthesis.*—Strategy for conception and evaluation of chemical processes. Assessment of reaction pathways and separation methods. Development of process flow sheets. Network analysis; computer-aided design; optimization of chemical processes. Prerequisites: CHEM 250, 260; CHML 341, 359. [2-0-2*; 0-0-0]

464. (1½) *Chemical Engineering Laboratory IV.*—Experiments in unit operations involving also instrumentation and control. Novel experiments. Field trip may be required. Prerequisites: CHML 362, 363. Corequisite: CHML 442. [0-6-0; 0-0-0]

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. Prerequisite: 3rd year Chemical Engineering or permission of instructor. [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. Prerequisite: 3rd year Chemical Engineering or Mechanical Engineering or permission of instructor. [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. Prerequisite: 4th year Chemical Engineering or permission of 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. Corequisite: CHML 353. [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 permission of instructor. [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. Prerequisite: CHML 341 or permission of instructor. [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. Prerequisites: CHEM 252, CHML 241 or permission of 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. [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. Prerequisite: 3rd year Chemical Engineering or permission of instructor. [0-0-0, 2-0-0]

491. (½) *Thesis Proposal.*—Literature searching, planning, equipment design, experimental design for an individual research project leading to a written proposal and oral presentation. Prerequisites: CHML 362, 363. [0-2-0; 0-0-0]

492. (2½) *Thesis.*—Research project under the direction of a staff member. Prerequisite: CHML 491. [0-0-0; 0-8-0]

498. (1) *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. Prerequisite: 4th year Chemical Engineering or permission of instructor.

550. (1-2)**d** *Industrial Kinetics.*—Topics 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 modelling 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.

588. (1) *Administration of Pulp and Paper Operations.*—A survey of the Canadian and global pulp and paper industry, markets for forest products, economic factors, management practices, communications, taxation, forest management, labour relations, environment control laws and requirements, project management and maintenance practices.

589. (1) *Modelling, Simulation and Process Control of Pulp and Paper Processes.*—Introduction to modelling and simulation of pulp and paper processes. Theory and design of control schemes for pulp and paper processes.

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 on assigned topic to include literature search, evaluation, mill visit to collect data, analysis of data, and project report.

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 (CHEM)
(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.*

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]

*151. (3) *Engineering Chemistry.*—Atomic and molecular structure; solid state chemistry; organic and inorganic chemistry; processes at surfaces; chemical thermodynamics; chemical equilibrium; electrolyte and non-electrolyte solutions; electrochemistry; process rates. Prerequisite: Chemistry 12. [3-3*-0; 3-0-1]

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 101. (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%). Mathematics 101 is recommended. 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 to 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 151 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. Prerequisite: Chemistry 151 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. (Chemistry 201 and 202, or 205 or 208 recommended). [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 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 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. (1½) *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. Huckel 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-aqueous solvents. Prerequisite: Chemistry 310 or 335. [2-0-1; 0-0-0]

405. (1) *Biophysical Chemistry.*—Macromolecular interactions in concentrated solutions; phase separation; ligand and ion binding; multivalent ligand binding to regular lattices. 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 or 260), and 304 (or 305 or 252). [2-0; 0-0]

407. (1½) *Applications of Statistical Mechanics to Chemistry.*—Introductory concepts of statistical mechanics and statistical thermodynamics. Application to chemistry with emphasis on understanding chemical reactivity. 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. (1½) *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, or 205 or 208. [0-0-0; 2-0-1]

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 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 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** *Chemistry Laboratory*.—Integrated laboratory course designed to illustrate principles of modern analytical, inorganic, organic and physical chemistry. Prerequisite: Chemistry 311 and 310 (or 335); for 1.5 units also need Chemistry 304 (or 305) or 330 (or 313); for 2 units also need Chemistry 304 (or 305) and 330 (or 313). 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. (1½) *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. [0-0-0; 2-0-1]

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. (1½) *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). [0-0-0; 2-0-1]

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*.—Subjects selected from: organometallic chemistry and catalysis, biological and medical aspects, group theory, coordination compounds, non-aqueous solvents, solid state chemistry, and physical inorganic 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 (CIVL)
(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: PHYS 170, MATH 154. [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. Prerequisites: CIVL 230, CHEM 150. [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 151. [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 forces, 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; asymmetrical 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 230. [0-0-0; 3-0-2*]

232. (1½) *Dynamics.*—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 270. [0-0-0; 3-0-1]

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. [3-0-0; 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. Prerequisite: CIVL 225. Corequisite: STAT 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 215, 230. 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) *Closed Circuit Hydraulics.*—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. Prerequisite: CIVL 215. Corequisite: MATH 257. [2-2*-1; 0-0-0]

316. (1½) *Open Channel Hydraulics.*—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 channel 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. Prerequisites: CIVL 215, MATH 255. [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.*—Structural systems, design codes, design loads. Timber design; bending, compression tension, and connections. Prerequisites: CIVL 230, 231. [3-0-2*; 0-0-0]

331. (1½) *Structural Design II.*—Introduction to limit states design of steel components for buildings. Use of micro-computers and commercial software (spreadsheets) for assignments in steel design. Prerequisite: CIVL 231. [0-0-0; 3-0-2*]

332. (1½) *Structural Anaylsis I.*—Introduction to indeterminate structural analysis methods: direct stiffness method; plane and space trusses, plane frames; virtual work; plastic collapse mechanisms; energy methods. Prerequisites: CIVL 231, MATH 152. [3-0-0; 0-0-0]

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. Prerequisite: CIVL 310. Corequisite: STAT 251. [0-0-0; 3-0-2]

400. (1½) *Construction Engineering Management.*—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. Prerequisites: CIVL 300 and 301. [0-0-0; 3-0-0]

402. (1) *Engineering Law and Contracts in Civil 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]

405. (1½) *Environmental Impact Studies.*—A course to familiarize the student with environmental impact assessment legislation and to discuss design and construction considerations useful in minimizing and mitigating such impacts. Description of the process of identifying and evaluating impacts will be provided. However the major thrust of the course will deal with engineering solutions to problems identified and evaluated by other disciplines. Prerequisite: CIVL 205. [3-0-0; 0-0-0]

406. (1½) *Concepts of Water and Wastewater Treatment, and Solid Waste Management.*—Processes used in water and wastewater treatment. Conditions which necessitate treatment of water or wastewater, water and wastewater treatment processes and plant design. Municipal services required and associated with solid waste management. Prerequisite: CIVL 205. [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

407. (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. Prerequisites: CIVL 205, CHEM 150. [1-3-0; 0-0-0]

410. (1½) *Foundation Engineering I.*—Design of spread footings, rafts and pile foundations according to modern professional practice. Procedures for estimation of bearing capacity and settlements, both immediate and long term. Design of structures associated with foundation excavations and site development such as braced cuts, retaining walls and anchored sheet pile bulkheads. Strong emphasis on the role of geological history, penetration testing and simple index properties in prediction of foundation performance. The principles of design and characteristics of field performance are illustrated by suitable case histories. Prerequisite: CIVL 311. [3-0-0]

411. (1½) *Foundation Engineering II.*—Aspects of Geotechnical Engineering Design considerations illustrated by case histories pertinent to B.C. Topics include: site investigation, terrain analyses, insitu testing, groundwater problems, deep foundations, tie back walls and bracing, tailings impoundments, Northern construction, ground ice, dikes and dam engineering. Many case histories presented in part by prominent consulting engineers in B.C. Prerequisite: CIVL 311. [0-0-0; 3-0-0]

412. (1½) *Soil Stabilization.*—Recognition, understanding, and treatment of problem soils for engineering purposes; mechanical, chemical, electrical and thermal methods of stabilization. Both a critique and term paper are required. Prerequisite: CIVL 311. [0-0-0; 3-0-0]

413. (1½) *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. Corequisite: CIVL 311 or equivalent. [0-0-0; 3-0-0]

415. (1½) *Water Resources Engineering.*—Planning and design of water resource projects, including the application of hydraulics, hydrology, economics and decision analysis. Urban drainage, flood control, hydro-electric, dams, reservoirs and multi-purpose projects. Prerequisite: CIVL 316, STAT 251. [0-0-0; 3-0-0]

416. (1½) *Hydraulic Engineering.*—General principles of hydraulic design illustrated by case studies. Design of pumping systems, including pump selection, open and closed conduits, spillways and hydraulic energy dissipators. Prerequisite: CIVL 316. [0-0-0; 3-0-0] or [3-0-0; 0-0-0]

417. (1½) *Coastal Engineering*.—General discussion of waves, linear wave theory, finite amplitude waves, standing waves, seiches; harbor design; wave shoaling, refraction and diffraction; beaches and coasts; wave statistics, wave generation; wave forces on piles, walls and breakwaters; tides; instrumentation and modelling techniques. Prerequisites: CIVL 215, MATH 257. [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

418. (1½) *Hydrology I*.—An introductory course to civil engineering hydrology to include: weather and hydrology, precipitation measurement and characteristics, streamflow measurement and characteristics, evaporation and snowmelt, hydrograph techniques, reservoir and channel routing, precipitation and runoff, statistical techniques in hydrology, and hydrologic modelling in large basins. Prerequisite: CIVL 316. [0-0-0; 3-0-0]

420. (1½) *Concrete Technology*.—Properties of concrete making materials; Portland cement, aggregates, water, and addmixtures; proportioning of concrete mixes and construction practices; mixing, transporting, placing, and curving; properties of hardened concrete; strength, fracture, fatigue, creep, shrinkage, and durability; modern developments in concrete technology; and new materials and practice. Prerequisite: CIVL 320 or equivalent. [0-0-0; 3-0-0]

421. (1½) *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. Prerequisite: CIVL 320 or equivalent. [0-0-0; 3-0-0]

430. (1½) *Structural Design III*.—Design of concrete structures, including beams, columns, slabs and footings. Prerequisite: CIVL 231. [3-0-0; 0-0-0]

431. (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. [3-0-0; 0-0-0]

432. (1½) *Advanced Structural Steel Design*.—Frame connections with high-strength bolts and welds, highway bridge loadings, composite beams of steel and concrete, welded steel plate girders. Prerequisite: CIVL 331. [3-0-0; 0-0-0]

433. (1½) *Advanced Concrete Design*.—Design of continuous reinforced concrete building frames and structures. Prerequisite: CIVL 430. [0-0-0; 3-0-0]

434. (1½) *Advanced Structural Design*.—Plastic analysis of steel beams and frames; analysis and design of prestressed concrete structures including design for flexure and shear, losses, volume change effects and anchorages. Prerequisites: CIVL 331, 430. [0-0-0; 3-0-0]

435. (1½) *Structural Analysis III*.—Computer implementation of the displacement method. Plane frames, nonlinear effects, lateral stability. Introduction to the finite element method. Prerequisites: CIVL 332, 431. [0-0-0; 3-0-0]

436. (1½) *Photogrammetric Surveying*.—Photogrammetry principles of continuous photogrammetric plotting machines; analogue and analytic methods of surveying from photographs; applications to engineering and allied problems. Prerequisite: CIVL 235. [0-0-0; 2-0-2]

439. (1½) *Engineering Surveying*.—Basic survey measurements and engineering applications of survey operations with error analysis, assessment of accuracy and choice of suitable method, photo interpretation of soils for engineering purposes; introduction to photogrammetry, modern instruments, remote sensing, data storage and retrieval, map projections and plane coordinates. Prerequisite: CIVL 235 or equivalent; and STAT 251 or equivalent. [3-3*-0; 0-0-0]

440. (1½) *Transportation Engineering II*.—Traffic operations and network analysis: traffic studies and data design; traffic stream flow and roadway analysis; weaving and interchange ramp analysis; intersection traffic control measures and control design; progressive signal system design; flows prediction; road network simulation and assignment algorithms; motor vehicle accident analysis; field exercises. Prerequisite: CIVL 340 [2-0-2; 0-0-0] or [0-0-0; 2-0-2]

441. (1½) *Transportation Planning Methods*.—An introduction to transportation systems planning: data needs; surveys and analysis; sampling techniques; trip generation; gravity concepts and models; mode split by deterministic methods; introduction to choice theory and models; route assignment by shortest path algorithms; stochastic assignment; transport system evaluation. Computer and interactive graphics application. Prerequisites: CIVL 340, CIVL 300. [0-0-0; 2-0-2]

442. (1½) *Highway Engineering*.—The integrated design and economic analysis of highways; design control; geometric design of alignment and grade; intersection and interchange design; user costs and cost-benefit analysis; highway maintenance management. Construction of roadway and pavements; construction materials and pavement, thickness design. Prerequisite: CIVL 340. [0-0-0; 2-0-2]

445. (1½) *Engineering Design and Analysis*.—Students will be expected to
Either: design and carry out an experimental project, including, where applicable, problem identification, purpose and scope of experimental procedures, equipment design and instrumentation performance testing, data logging, interpretation and analyses, and conclusions; the project may be either laboratory or site oriented;
Or: carry out a project through the development of conceptual, preliminary and final design, which might also include feasibility study, economic aspects, material selection and design, and construction scheduling.
Comprehensive group report required 2 weeks before the end of classes. Groups of 2 to 4. Prerequisite: Registration in 4th year Civil Engineering. [0-0-0; 0-6-0]

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. Prerequisite: CIVL 235. [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. Prerequisite: 4th year standing. [2-0-0; 0-0-0]

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]

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. Prerequisite: 4th year standing. [2-0-0; 0-0-0]

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*.—Behaviour 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 400, 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 400, 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 or 402.

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 420, 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 Element Method.*—Boundary value problems; review of finite differences; weighted residual methods, Galerkin; computer algorithms. Example applications, Laplace's equation, two-dimensional elasticity.

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 or 417.

548. (1) *Coastal and Offshore Modelling.*—Laboratory and numerical modelling in coastal and offshore hydrodynamics: model laws; laboratory facilities; instrumentation; numerical techniques; applications to wave-structure interactions, wave hindcasting, wave propagation, sedimentation problems and mixing processes.

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 or 418.

554. (1) *Water Resource Management.*—Patterns of development. Management considerations for water resource systems, including comprehensive river basin development. Application of analytical techniques.

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 or 301.

556. (1) *Application of Systems Engineering Techniques.*—The application of systems engineering techniques, such as optimization, decision analysis and risk analysis to civil engineering systems. Case studies are used to illustrate the matching of problem to technique, the most important step in practical applications.

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) *Biological Waste Treatment.*—Development of the principles of secondary, biological treatment processes, with application to both municipal and industrial wastewater treatment. Discussion of different treatment methodology, incorporating both aerobic and anaerobic microbiological processes. Corequisite: MICB 417 or equivalent.

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 CIVL 310 and CIVL 311.

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 CIVL 310 and 311, 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 critical 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, queueing 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.

597. (0) *Seminar.*—Presentations and discussions of current research topics in various disciplines of Civil Engineering.

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.

Classical Studies (CLST)

(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. Recommended as preparation for Classical Studies 436 and Philosophy 333. (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. (1½/3)**d** *Life and Society in Classical Antiquity.*—Topics in Greek and Roman life and society, such as classical astronomy and ancient medicine. [3-0] or [3-0; 3-0]

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]

306. (1½) *Applied Science and Technology in Classical Antiquity.*—The origins and achievements of applied technology in the Greek and Roman world from the Bronze Age to late Antiquity, with special attention to archaeological evidence. [3-0]

307. (1½) *Greek Law.*—The study of Greek legal theory, practice, and institutions from their origin in self-help, through the early lawgivers and their codes, to the developed system of Athens in the fifth and fourth centuries. A variety of test cases from the works of the Greek orators will be explored. [3-0]

308. (1½) *Roman Law.*—The development of Roman private law during the classical period with special attention to family law, contract and delict. [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, *Iliad* and *Odyssey;* Virgil, *Aeneid;* Ovid, *Metamorphoses;* Petronius, *Satyricon;* Apuleius, *Golden Ass;* Longus, *Daphnis and Chloe;* Heliodorus, *Aethiopica.* Classical forerunners of the novel. In translation. [3-0; 3-0]

316. (3) *Classical Drama.*—Study of a wide range of plays, both tragedy and comedy, by the Greek and Roman dramatists, in translation. [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 of the instructor. [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 of the instructor. [3-0; 3-0]

335. (3) *Summer Practicum in Classical Archaeology.*—Practical training in excavation techniques and interpretation, including survey and mapping procedures, recording, drawing and analysis of artifacts, and study of comparative material. Students will participate in the excavation of a Greek or Roman site in Europe or the Middle East for the summer session. The course will include lectures and field-excursions relevant to the region and period of the site.

429. (1½/3)**d** *Studies in the Art and Archaeology of Greece and Rome.*—Prerequisite: Classical Studies 330/Fine Arts 329 or permission of the instructor. (Also listed as Fine Arts 429.)

430. (1½) *Topography and Monuments of Ancient Athens.*—A study of the ancient city with special attention to the archaeological sources. Prerequisite: Classical Studies 330/Fine Arts 329 or permission of the instructor. [3-0]

431. (1½) *Topography and Monuments of Ancient Rome.*—A study of the ancient city with special attention to the archaeological sources. Prerequisite: Classical Studies 330/Fine Arts 329 or permission of the instructor. [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 of the instructor. [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 of the instructor. [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 of the instructor. [3-0; 3-0]

501. (1½) *Topography and Monuments of Athens.*—A study of the topography and monuments of ancient Athens from the Bronze Age to Late Antiquity. Offered in the first term of alternate years.

502. (1½) *Topography and Monuments of Rome.*—A study of the topography and monuments of ancient Rome from the Iron Age to Late Antiquity. Offered in the second term of alternate years.

503. (1½/3)**d** *Studies in Greek Architecture.*—Selected topics in Greek architecture, e.g., religious, secular, and military architecture.

504. (1½/3)**d** *Studies in Roman Architecture.*—Selected topics in Roman architecture, e.g., religious, military, domestic, and public secular architecture.

505. (1½/3)**d** *Studies in Greek Town Planning.*—The development of Greek town planning from the Bronze Age to the Hellenistic period.

506. (1½/3)**d** *Studies in Roman Town Planning.*—The origins of town planning in Italy and the development of cities in the Roman Empire.

507. (1½/3)**d** *Studies in Greek Painting.*—Selected topics in Greek painting, e.g., Athenian vase painting, regional styles of vase painting, Hellenistic painting.

508. (1½/3)**d** *Studies in Roman Painting and Mosaics*.—Selected topics in Roman painting and mosaics, e.g., Campanian wall painting, regional styles of mosaic decoration.

509. (1½/3)**d** *Studies in Greek Sculpture*.—Selected topics in Greek sculpture, e.g., development of kouros and kore, Hellenistic sculpture, sculpture of fifth-century Athens.

510. (1½/3)**d** *Studies in Roman Sculpture*.—Selected topics in Roman sculpture, e.g., imperial relief sculpture, portraiture, regional styles.

511. (1½/3)**d** *Studies in Greek Regional Archaeology*.—Study of a particular area, e.g., Ionia, Sicily, Southern Italy.

512. (1½/3)**d** *Studies in Roman Provincial Archaeology*.—Study of a particular area, e.g., Gaul, Britain, Asia Minor.

513. (1½/3)**d** *The Archaeology of Greek and Roman Technology*.—Material evidence for the technological achievements of the Greek and Roman world.

514. (1½/3)**d** *Greek and Roman Minor Arts*.—Minor arts of the Greek and Roman world, e.g., coins, jewellery, terracottas.

515. (1½/3)**d** *Directed Studies in Classical Archaeology*.

Classical Studies 503 through 515 not offered each year. Consult the Department of Classics.

Classics—See Classical Studies, Greek, Latin.

Commerce (COMM)

(Faculty of Commerce and Business Administration)

In general, prerequisites are not listed in the Commerce course section of the Calendar. The required courses in second year Commerce normally are prerequisite to the courses in third 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.

111. (1½) *Business Applications of Calculus*.—Introduction to differential and integral calculus and their applications in business.

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.

290. (2) *Introduction to Decision Analysis*.—Introduction to decision models in business; production planning; linear programming; probability theory and discrete random variables.

291. (2) *Application of Statistics in Business*.—The methods and applications of statistics in business; continuous random variables; sampling; estimation of parameters; hypothesis testing; and regression analysis. Prerequisite: Comm 290.

292. (2) *Management and Organizational Behavior*.—Behavior in organizations as it affects people as individuals, their relationships with others, their performance in groups and their effectiveness at work.

293. (1½) *Financial Accounting*.—Introduction to the construction and interpretation of financial reports prepared primarily for external use.

294. (1½) *Managerial Accounting*.—Introduction to the development and use of accounting information for management planning and control and the development of cost information for financial reports.

296. (1) *Introduction to Business and Management*.—Introduction to the basic concepts of management and administration; the internal operation of the enterprise; the relationship between the enterprise and the business environment; the analytical tools including computer literacy used in management.

297. (1½) *Capital Markets and Institutions*.—Economic environment in which business operates, including the role of the Bank of Canada, analysis of domestic and international money markets and institutions and the basic capital asset valuation models.

306. (1½) *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. (1½) *Decision Analysis I*.—(For Graduate students only.) Quantitative methods such as decision analysis, mathematical programming and introductory probability theory as applied to business problems.

312. (1½) *Decision Analysis II*.—(For Graduate students only.) The theory and use of statistics in business. Hypothesis testing, regression analysis, estimation. Prerequisite: Commerce 311.

313. (1) *Quantitative Methods—Analysis*.—(For Graduate students only.) Theory and applications of basic mathematics and calculus to business problems.

320. (1½) *Organizational Analysis*.—An analysis of organizational structures and intraorganizational processes; effects of organizational factors on individual behaviour.

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.

326. (1) *Human Resources Management II*.—(For Graduate students only.) Managerial functions with special emphasis on labor relations, related issues and managerial skills.

327. (1½) *Research Methods for Human Resource Management*.—Problems related to the collection of data within organizations to support changes in personnel policies and practices. Basic principles of scaling, experimental and quasi-experimental design and research ethics.

328. (1½) *Administration of Collective Agreements*.—Grievance handling in collective agreements; the arbitration process; arbitral jurisprudence; substantive grievance issues such as discipline and promotions. Prerequisite: Commerce 392 or Commerce 322.

329. (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. (For non-Commerce students in 3rd and 4th year.)

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.

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.

334. (1½) *Land Law*.—Legal principles and concepts relating to real estate and land development.

335. (1½) *Information Systems Technology and Development*.—Introduction to information technology related to business use; Design Implementation and Application of Information Systems. Prerequisite: Commerce 391 or Computer Science 210.

336. (1) *Information Systems for Management*.—(For Graduate students only.) Introduction to information systems concepts for managers. Use of modern information technology by individuals, groups and organizations. Inter-organizational information systems and the role of information systems as an element of corporate strategy.

339. (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.

341. (1½) *Business Logistics*.—The role of logistics in marketing, production and corporate strategy. Methods and practice in the integration of transportation, inventory control and other distribution functions.

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.

349. (1½) *Transportation Management I*.—Introduction to transportation with emphasis on management decision-making for marketing, operations and labour relations. Cases are drawn from all modes of transportation.

351. (1½) *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.

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.

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) *Consumer Behaviour*.—The use of consumer research and theory in marketing and policy decisions. Psychological, sociological and economic theory and research relevant to consumer behaviour are considered.

363. (1½) *Marketing Analysis*.—Analytical methods applicable to marketing management decision making; attention to strategic considerations linking analysis of consumer data, corporate data, environmental factors, and competitive response. The course makes extensive use of micro computers.

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 Research*.—The process of marketing research including topics such as problem/opportunity formulation, research objectives, data sources, research instrument design, sampling, data collection and processing and methods of data analysis.

366. (1½) *Marketing Research Problems*.—The application of research methods to problems in marketing.

371. (1½) *Theory of Finance*.—Basic concepts of corporate finance, including security valuation and financial decisions by the corporation. Prerequisite: Commerce 397.

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: Commerce 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. (1½) *Production/Operations Management*.—Production planning and scheduling, inventory control, control of materials, purchasing, quality assurance, capacity management and industrial location decisions.

384. (2) *Industrial Management*.—(For Forestry and Agriculture students only.) A survey of industrial management principles, problems, practices, and procedures.

388. (1½-3)**d** *Seminar in Arts Administration*.—(For Graduate students only.) Characteristics and special problems of arts organizations in the public and private sectors. Contents include cultural policy; environmental factors; accounting and control; funding; marketing; legal consideration; and findings from arts research.

391. (1½) *Introduction to Management Information Systems*.—Overview of computer technology and terminology; use of computers as managerial and administrative tools; the management of computer resources and the influence of information technology within the organization.

392. (1½) *Labour Relations*.—Management of employment relations as conducted through collective bargaining and trade unions. Emphasis on public policy, negotiation processes, and dispute resolution.

393. (2) *Commercial Law*.—Introduction to the law of contracts, with particular reference to contracts for sale of goods and related law of personal property; negotiable instruments; principles of agency, partnerships and company law.

394. (1½) *Government and Business*.—Roles of government and business in the Canadian economy including effects of public policy on the business environment.

396. (2) *Introduction to Marketing*.—Basic considerations affecting the domestic and international marketing of goods and services.

397. (1½) *Business Finance*.—Examination of the corporate enterprise decisions including working capital management, capital budgeting; capital structures and dividend policy. Prerequisite: COMM 297.

400. (3-7½)**d** *Study Abroad*.—A one term program of regular undergraduate studies at a foreign university under an existing formal exchange program.

406. (1½) *Urban Public Finance and Government Land Policy*.—Analyses of local government expenditures and taxes and their impact on real estate markets; public policy and the markets for land and housing.

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) *Intermediate Business Statistics*.—Statistical techniques useful in business environments. Includes regression analysis, analysis of variance, forecasting, and logit and probit analysis. Credit may be obtained for only one of Statistics 300, 306, and Commerce 411.

420. (1½) *Topics in Organizational Behaviour*.—Current development in the theory and research literature in organizations. Topics include work motivation, leadership, organization design, and group process. Prerequisite: Commerce 292.

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.

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.

427. (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 the line managers and staff specialists are emphasized. Prerequisite: Commerce 327.

428. (1½) *Personnel and Human Resource Management II*.—Training and development, performance appraisal and career management. Prerequisite: Commerce 327.

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.

436. (1½) *Information Systems Analysis and Design*.—The process of information systems development; Modern techniques and tools for systems analysis and design. Prerequisite: Commerce 335.

437. (1½) *Database Technology*.—Theory and technology of database management from an applications perspective; database design; database administration. Prerequisite: Commerce 335. Credit will not be granted for both Commerce 437 and Computer Science 404.

438. (1½) *Management of Information Systems*.—Managerial Issues in the Administration of Computerized Information Systems. Prerequisite: Commerce 436.

439. (1½) *Advanced Topics in Management Information Systems*.—Decision Support Systems, Expert Systems, Office Information Systems; Integration of material from previous MIS courses. Prerequisites: Commerce 436 and one of Commerce 437 or Computer Science 404.

441. (1½) *Advanced Business Logistics*.—Analysis of complex logistic problems and the formulation of corporate logistic strategies. Prerequisite: Commerce 341.

444. (1½) *Air Transportation*.—An integrative treatment of airline management recognizing the particular economic features of the industry, and the domestic and international legal and regulatory regimes under which the carriers operate.

445. (1½) *Shipping and International Logistics*.—The characteristics of shipping services and the role of shipping services in the design and management of international logistics systems.

447. (1½) *Urban Transportation and Project Appraisal*.—Economic issues in providing urban transportation services including cost of alternate systems, demand analysis and impact assessment. Project appraisal and financial problems.

449. (1½) *Transportation Management II*.—Problems in transportation management including demand and cost analysis, integrated service and pricing strategies, and operations design and control. Prerequisite: Commerce 349.

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. (1½-3)**d** *Financial Accounting-Advanced*.—An examination of specialized topics of advanced financial accounting.

454. (1½) *Advanced Management Accounting*.—Design of management planning and control systems, including an analysis of the impact of investment project evaluation, information asymmetries, decentralized organizational structures and design of management incentive schemes.

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.

460. (1½) *Public and Nonprofit Marketing Management*.—Examines the role, use, and application of marketing in government agencies and nonprofit institutions.

461. (1½) *Sales Management*.—Theory and management of personal selling. Strategy, tactics, and implementation of sales program.

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.

464. (1½) *Selected Topics in Marketing*.

465. (1½) *Marketing Management Models*.—Application of research methods to problems in marketing; selected techniques of measurement and analysis; the use of behavioural and quantitative models in marketing.

466. (1½) *Industrial Marketing Problems*.—Managerial problems in marketing industrial products, services, and commodities; problem analysis of producer goods and specialized channels of distribution.

467. (1½) *Marketing Strategy*.—Strategic marketing analysis; product, communications, pricing and distribution strategies; and governmental regulation of marketing processes.

468. (1½) *Marketing Management Applications*.—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) *Financial Management*.—Advanced problems of financial management. Debt policy and capital structure planning; capital costs, capital budgeting, dividend policy, valuation, mergers and acquisitions.

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.

488. (1½) *Public Sector Management*.—This course focuses on some of the distinctive aspects of managing in the public sector.

489. (1½) *Topics in Policy Analysis and Public Policy*.—Current developments in the theory and practice of policy analysis applied to specific issues in the public and private sectors.

490. (1½/3)**d** *Directed Studies in Commerce*.—An investigation and report on a topic to be agreed upon by a member of the faculty and a senior student.

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) *Management Simulation*.—Student teams manage hypothetical firms in a complex simulation, coordinating production, finance, marketing and strategic planning in competition with other teams.

493. (1½) *Business/Public Policy Project*.—Research-oriented study of advanced business or public problem, culminating in formal written report and oral presentation.

494. (1½) *Corporate and Industry Analysis*.—A general framework for the analysis of industries for the purpose of shaping corporate strategy and public policy. Focuses on market structure, the conduct of firms and industry performance.

498. (1½) *International Business Management*.—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 socio-cultural systems and political systems.

500. (3-7½) *Study Abroad*.—A one term program of regular graduate studies at a foreign university under an existing formal exchange program.

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) *Foundations of Optimization*.—Linear and nonlinear programming models with selected applications in business. Prerequisites: a course in linear algebra and in calculus.

516. (1½) *Optimization Theory and Applications*.—Theory and methods of optimization and selected business applications. Prerequisite: a first course in Optimization.

517. (1½) *Discrete Optimization, I*.—Discrete optimization models, algorithms and applications. Prerequisite: a course in linear programming.

518. (1½) *Discrete Optimization, II.*—Discrete optimization models and algorithms, including advanced integer programming and network flow models. Prerequisite: a course in discrete optimization.

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: COMM 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.

526. (1½) *Corporate Reorganizations.*—Objectives, problems, management activities, organizational structures, and corporate governance during and after major reorganizations, including corporate acquisitions, mergers and other consolidations, joint ventures, bankruptcies, and changes in diversification.

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.

533. (1½) *User-Oriented Information Technology.*—Methods and techniques of Information Systems from the perspective of the system user. The impact on managerial work of information technology including microcomputers and standard software packages. Student use of these technologies is an integral part of the course. Credit not granted for both Comm 533 and Comm 534. Intended for graduate students not planning a specialization in M.I.S.

534. (1½) *Developing Information Systems.*—The design and implementation of operational level data processing systems and decision support systems. Intended primarily for those planning to specialize in M.I.S. Credit granted for only one of Commerce 533 and Commerce 534.

536. (1½) *Analysis and Design of Information Systems.*—Methodologies and techniques for studying business systems, defining requirements and generating specifications for information systems. Prerequisite: COMM 533 or COMM 534.

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.*—Major topics essential for carrier management decisions and public policy analysis in transportation, including (1) demand analysis and forecasting for transportation services, (2) cost estimation and costing for specific traffic, (3) pricing under different market and competitive conditions and (4) capacity investment decisions.

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.

548. (1½) *Directed Study in Business Administration.*—M.B.A. students may only take 1½ units of directed study in their program.

549. (3/6)e *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. (1½) *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 existing 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.

580. (1½) *Business Statistics.*—Statistical techniques, including regression analysis, analysis of variance, forecasting, and logit and probit analysis. Credit not granted for both Commerce 580 and 581.

581. (1½) *Statistical Methodology, I.*—Statistical techniques and their application to business problems, especially linear statistical models. Credit granted for only one of COMM 580 and 581. Prerequisite: Statistics 305 or equivalent.

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 methodology 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, semiMarkov, 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 semiMarkov processes. Applications to inventory and queuing control will be considered.

587. (1½) *Applied Stochastic Processes II.*—A continuation of COMM 585. Examining stochastic processes at a more advanced level.

588. (1½) *Public Policy Analysis and Management.*—Theories of government intervention in the economy, methods of public policy analysis, public sector management techniques, and analysis of selected fields of public policy.

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. (1½-4½) *Topics in Business Administration.*— Topics vary annually.

591. (1½) *Management Strategy and Policy.*—An integrative approach to strategic planning and general management.

592. (1½) *Management Simulation.*—Student teams manage hypothetical firms in a complex computer simulation, coordinating production, finance, marketing and strategic planning in competition with other teams.

593. (1½) *Corporate Planning Models.*—Analytical techniques in corporate planning. Includes consideration of multiple objectives, planning under uncertainty and the competitive environment. Prerequisite: COMM 591.

594. (1½) *Business, Government and Society.*—Analysis of government intervention in business. Includes normative and positive approaches to government behaviour and the forces that influence the behaviour of government.

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: Completion of First Year M.B.A.

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.*

604. (1½) *Advanced Topics in Urban Land Economics I.*—This seminar will cover advanced topics in real estate asset pricing, mortgage markets, housing demand and rationing mechanisms in housing finance.

605. (1½) *Advanced Topics in Urban Land Economics II.*—This seminar will cover advanced topics in location theory, spatial pricing, optimum towns, housing, urban structure, and land development.

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) *Advanced Topics in Optimization.*—The topic and content will vary from year to year.

625. (1½) *Micro-Level Organizational Behaviour.*—Theoretical and research contributions from social psychology relevant to behaviour in business organizations. Emphasis on evaluation and synthesis of theories and related empirical evidence.

626. (1½) *Seminar in Organizational Theory.*—Deals with the major controversies concerning perspectives on action and levels of analysis, and how major theoretical schools approach these issues through topics such as organizational design, technology and environment, politics and intergroup conflict.

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.

634. (1½) *Research Seminar in Management Information Systems.*—Intended primarily for doctoral candidates. Forum for presentation, discussion and critique of current MIS research.

635. (1½) *Advanced Topics in Management Information Systems.*—Technology, techniques, methodologies, managerial and theoretical issues of management information systems.

636. (1½) *Workshop in Management Information Systems.*—A series of seminars given by invited or resident faculty and graduate students on current research issues in management information systems.

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.

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) *Advanced Topics in Marketing.*—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.*

682. (1½) *Advanced Topics in Stochastic Models.*—The topics and content will vary from year to year.

691. (1½) *Advanced Topics in Policy Analysis.*

692. (1½) *Research Seminar in Policy Analysis.*—Presentation, discussion, and criticism of research work by faculty and advanced graduate students.

693. (1½) *Seminar in Research Methodology 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.

694. (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 693.

695. (1½) *Research in Capital Markets.*—Empirical investigations of capital market issues including three facets of the investigation: current practice and methods, underlying structure and motivation of investigations, and results. Subjects chosen will vary with the instructor. Background in financial theory and econometric methods necessary.

Community and Regional Planning (PLAN)

(Faculty of Graduate Studies)

425. (1½) *Urban Planning Issues and Concepts.*—Evolution, practice and future of urban planning and development, with emphasis on institutional arrangements, housing, transportation, urban design and development control. For third- and fourth-year undergraduate students interested in urban planning. 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.*—The design and use of problem-solving procedures. The effective leadership of planning groups, and the development of appropriate community planning processes. Styles of public participation.

501. (1½) *History of Community and Regional Planning.*—The origins and evolution of modern urban and regional planning in North America and Europe, emphasizing the changing role of government in the development of Canadian communities during this century.

502. (1½) *Planning Theory.*—Historical and contemporary concepts of the planning process and its legitimacy. The role of the state, public interest, and the responsibilities of professional planners. Concepts and codes of professional ethics.

503. (1½) *Planning for Community Economic Development.*—Theories of community economic development planning. Concepts of community wealth, income, growth and development. Models of the formal and informal community economy.

504. (1½) *The Ecological Context of Planning.*—A planning-oriented approach to ecosystems theory emphasizing the structural and functional properties of the biophysical environment. Definition of the urban-centered region in terms of interregional flows and ecological accounts.

505. (1½) *Community Development Planning.*—Evolution of development theory emphasizing the changing relationships among community, state and individuals. Development paradigms and alternative concepts of community.

506. (1½) *The Legal Context of Planning.*—Legal principles affecting the administration of planning programs including the meaning and sources of the law, the separation of the functions of government, the Canadian Constitution and Charter of Rights and Freedoms, the law of Canadian municipal corporations, natural resource law, the nature and control of administrative action, judicial review of discretionary power, and the drafting of legislation.

507. (1½) *Regional Development Planning.*—Origins, theory, and practice of planning for regions in Canada and abroad. Types of planning regions, institutional forms for regional planning, regional disparities, and approaches to regional analysis. Resource frontiers, urban, amenity, and rural regions provide the policy context.

510. (1½) *Computers in Planning.*—Application of computer programs to planning practice, including the integration of databases, spreadsheets, and graphics. (Graded on a pass-fail basis.)

511. (1½) *Quantitative Reasoning and Statistics for Planning.*—Research design and statistics for the analysis of empirical issues in planning and policy studies.

512. (1½) *Forecasting and Simulation Analysis in Planning.*—Methods of constructing demographic and economic projections.

513. (1½) *Economic Impact and Evaluation for Planning.*—Topics include economic base, income-expenditure, input-output, computer simulation, cost-benefit, goals achievement matrix and the planning balance sheet.

514. (1½) *Impact Analysis for Planning.*—A planning-oriented approach to environmental impact asssessment emphasizing institutional, procedural and methodological issues. The conceptual and systemic relationship among biophysical, social and economic impact assessment and the evolving relationship with community development planning.

515. (1½) *Data for Planning Practice.*—Data collection and analysis in relation to professional practice and the scientific method. Questionnaire surveys and alternatives including secondary analysis, unobtrusive measures and client participation techniques.

520. (1½) *Urban Infrastructure Planning and Development.*—Policy considerations in the provision of infrastructure including the legal framework, institutional arrangements, and public finance. Planning considerations in drainage, waterworks, sewerage and waste management.

521. (1½/3)**d** *Residential Site Planning Studio.*—Evaluation of neighbourhoods and projects, site analysis, housing types and densities, provision of community facilities and services, and the design of site plans.

522. (1½) *Housing and Community Planning.*—The social, economic, political and land use dimensions of Canadian housing in the context of demographic trends, housing demand and affordability. Recent trends in housing policy and the role of the public and private sectors in housing supply.

523. (1½) *Neighbourhood Planning.*—Concept of neighbhourhood including theories of land use, social behaviour and urban economics. Public policy options for the formulation of local area plans.

524. (1½) *Urban Transportation Planning.*—Topics include the relationship between transportation and urban activity systems; analysis of supply and demand; accessibility and environment; institutional arrangements and public finance.

525. (1½) *Urban Planning Law.*—Legal methods, institutional and administrative arrangements for the implementation of urban plans including control of land use, subdivision, aesthetics, building construction and advertising. Legal means for historic and scenic preservation. Expropriation and public land development. Problems in intergovernmental jurisdiction. (Prerequisite: Planning 506.)

526. (1½/3)**c** *Public Policy and Urban Planning.*—Development of public policy in theory and practice. The impact of federal, provincial and local government policies on urban and regional planning. Exercises in policy making and documentation.

527. (1½) *Housing Seminar.*—(Prerequisite: Planning 522.)

528. (1½/3)**c** *Urban Design*—A studio/seminar on the history of the physical form of cities and theories of city design. Topics include social impacts, heritage and environmental conservation, urban revitalization, and the legal and administrative instruments for the implementation of city designs.

529. (1½) *Urban Planning in Developing Countries.*—Policies concerning basic needs and poverty alleviation focusing on housing and transportation. The role of the informal sector, nongovernmental agencies, international lending, aid and research institutions, and the transfer of technology.

530. (1½) *Resource Analysis for Regional Planning.*—An ecological approach to land use and resource analysis for regional planning covering inventory, classification, and alternative methods of analysis.

531. (1½) *Perspectives on Natural Resources Planning.*—Alternative economic, institutional, environmental, political, cultural, and ecological perspectives on natural resources planning.

532. (1½) *Planning and Negotiation in Natural Resources Management.*—Institutional structures for policy development and implementation.

533. (1½) *Seminar on Environmental-Economic Systems.*—Relationships between economic activity and the biophysical environment. Topics include the assumptions and determinants underlying economic growth, market failure and traditional approaches to public intervention, the implications of alternatives such as the steady-state economy and sustainable development. (Prerequisite: Planning 504.)

534. (1½) *Planning for Water Resources Management.*—The relationships among relevant bio-physical, socio-economic and institutional systems as applied to regional planning for watersheds, lakes, estuaries, coastal zones and international river basins. Water supply, waste disposal, fisheries, aquaculture, recreation, hydropower and flood control.

535. (1½) *Seminar in Regional Development Planning.*—(Prerequisite: Planning 507.)

536. (1½) *Citizens in Environmental Planning and Management.*—The cultural, ethical, political and institutional foundations of citizens' involvement in environmental planning for sustainable resource use.

540. (1½-6)**d** *Planning Project.*—Group preparation and presentation of a professional report.

545. (1½/3)**d** *Planning Studies Abroad.*—An extended site visit outside Canada to understand the cultural context for community and regional planning issues and the local institutional response.

548. (½-6)**d** *Current Issues in Planning.*—Each year the school may offer one or more courses on a topical issue covering recent advances in the field.

549. (3-6)**c** *Thesis for the Master's Degree.*—Research and preparation of a thesis on a topic in public policy or professional practice.

550. (1½-6)**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 (COML)

(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 (CPSC)

(Faculty of Science)

*For students in the Faculty of Applied Science.

***Additional fees are charged for these courses. See Index "Fees — Special Fees".*

Note: Students wanting a comprehensive introduction to Computer Science as a discipline should take Computer Science 124 and 126. Computer Science 124 alone is not recommended. Computer Science 100, 111 and 118 are intended for students who do not plan to pursue degree programs in the Department of Computer Science. Computer Science 114 and 116 are no longer offered. Credit for Computer Science 116 is equivalent to credit for Computer Science 118. Students may NOT obtain credit for more than one of Computer Science 100, 111, 114, 124 and 151. Consult the Department for further information.

Enrolment in Computer Science courses numbered above 200 is controlled by stringent academic admissions criteria. Students should consult the Computer Science Department during the spring or summer to determine the criteria for admission. Students will be denied entry into third year courses where only a minimum pass has been obtained in prerequisite second year courses.

100. (1½) *Elements of Computer Science.*—An introduction to computer applications and programming. Fundamental computer concepts; programming; history, structure, and social implications of computers. Credit will be given for only one of CPSC 100, 111, 114, 124 and 151. [3-3-1; 0-0-0] or [0-0-0; 3-3-1]

111. (1½) *Introduction to FORTRAN Programming.*—A 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 124 and 126. Prerequisite: Mathematics 100 or equivalent (may be taken concurrently). Credit will be given for only one of Computer Science 100, 111, 114, 124, 151. [3-1; 0-0] or [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 either Computer Science 12 (Provincial) or one of CPSC 100, 111, 151. This course is not intended for students who plan to pursue a degree program in the Department of Computer Science. Credit will be given for only one of CPSC 118 and 126. [3-3-1; 0-0-0] or [0-0-0; 3-3-1]

124. (1½) *Principles of Computer Science I.*—Mathematical introduction to computer science, including procedural and data abstraction, and an introduction to program design methodology. This course is normally followed by CPSC 126. The sequence CPSC 124/126 is the intended prerequisite for advanced study in Computer Science. Computer Science 12 (Provincial) is helpful. Prerequisite MATH 100 (may be taken concurrently). [3-3-1; 0-0-0]

126. (1½) *Principles of Computer Science II.*—Mathematical introduction to computer science, including models of computation, program design methodology, computer organization and compiling. This course normally follows CPSC 124. The sequence CPSC 124/126 is the intended prerequisite for advanced study in Computer Science. Students who complete CPSC 126 will not receive subsequent credit for CPSC 118. Prerequisite: CPSC 124. [0-0-0; 3-3-1]

*151. (1½) *Introduction to FORTRAN Programming.*—A practical introduction to computer use. Aspects of structured FORTRAN and some common algorithms and applications. 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 100, 111, 114, 124, and 151. [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. [3-0-1; 0-0-0] or [0-0-0; 3-0-1]

213. (1½) *Computer Organization.*—Basic components and structure of a computer. Computer arithmetic. Assembly language. Operating system services; input/output; exception handling; computer communications. Prerequisite: Computer Science 116 or 118. Note: Credit will not be given for both Computer Science 213 and Electrical Engineering 259. [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) *Co-operative 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) *Co-operative 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. (1½) *Numerical Computation for Algebraic Problems.*—Numerical techniques for basic mathematical processes involving no discretization, and their analysis. Solution of linear systems, including analysis of roundoff errors; norms and condition number; introduction to iterative techniques in linear algebra, including eigenvalue problems; solution to nonlinear equations. Prerequisites: CPSC 118 or 126, MATH 200 and 221. [3-0; 0-0]

303. (1½) *Numerical Approximation and Discretization.*—Numerical techniques for basic mathematical processes involving discretization, and their analysis. Interpolation and approximation, including splines and least squares data fitting; numerical differentiation and integration; introduction to numerical initial value ordinary differential equations. Prerequisites: CPSC 118 or 126, MATH 200 and 221. [0-0; 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. (1½) *Software Engineering.*—The design and implementation of large, multimodule program systems. Software life cycle. Design tools. Features and use of module-oriented programming languages. Intermodule communication. Prerequisites: CPSC 210, 220. (CPSC 220 may be taken concurrently.) Applied Science students may use ELEC 320 as a prerequisite in place of CPSC 220. [3-0; 0-0] or [0-0; 3-0]

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]

315. (1½) *Introduction to Operating Systems.*—Introduction to batch, multiprogramming and time-sharing systems. Process synchronization and communication. Main memory allocation techniques including virtual memory. Process scheduling. Deadlock avoidance and prevention. File organization and device management. Prerequisites: CPSC 210 and 213. Credit can be obtained for only one of CPSC 315 and ELEC 315. [3-1; 0-0] or [0-0; 3-1]

318. (1½) *Machine Structures.*—Machine organization and classification. Instruction formats and addressing. Input/Output including bus protocols, memory-mapped I/O, direct memory access, and interrupts. Processor architectures including instruction classes, instruction cycle, microprogramming, representation of numeric and non-numeric data. Memory organization. Advanced computer architectures. Credit will be given for only one of CPSC 318, ELEC 476. Prerequisites: CPSC 210, 213. [0-0; 3-1]

319. (1½) *Software Engineering Project.*—The design, implementation, and test of a large software system, using a team approach. Prerequisite: CPSC 310 (may be taken concurrently). [1-0; 1-3]

320. (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]

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) *Co-operative 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) *Co-operative 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: CPSC 303 and one of MATH 300, 315 or 320. [0-0; 3-0]

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. Prerequisites: Computer Science 210 and Statistics 241. [3-0; 0-0]

406. (1½) *Algorithms for Optimization.*—The study of algorithmic issues arising in the solution of fundamental combinatorial optimization problems and their applications. Topics include: implementations based on advanced data structures, heuristic algorithms specifically branch and bound, approximation algorithms, complexity and sensitivity analysis. Prerequisites: Computer Science 320; Mathematics 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]

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]

414. (1½) *Computer Graphics.*—Physical and virtual input and output devices. The Graphical Kernel System: workstations, coordinate systems, output primitives, segments, attributes, input primitives, metafile, the GKS environment. Mathematics and algorithms: transformations, clipping, line generation, area fill. Representation of graphical data. Architecture of graphics systems. High-level graphical languages. Prerequisite: CPSC 213 or ELEC 358. (This course is the same as ELEC 478) [3-0; 0-0]

415. (1½) *Advanced Operating Systems.*—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: CPSC 315 or ELEC 315. [0-0; 3-0]

416. (1½) *Distributed Systems.*—Introduction to distributed operating systems. Communication architecture and models for interprocess communication. Process migration, naming, distributed file systems, fault tolerance, and concurrency control. Prerequisites: CPSC 315 or ELEC 315. CPSC 318 is recommended. [3-0; 0-0]

417. (1½) *Computer Communications.*—Layered protocols, packet switching, data communications, and queuing analysis. Data link controls. Virtual circuits, datagrams, network design, routing, flow and congestion control. Satellite and packet radio links. Local area networks. Prerequisites: CPSC 315 and one of STAT 241 or MATH 302. Credit will be given for only one of Computer Science 417 and Electrical Engineering 456. [3-0; 0-0]

418. (1½) *Advanced Computer Architectures.*—Introduction to advanced processor architectures and taxonomical views; performance considerations. Introduction to parallel machine designs. Examination of pipeline organizations; pipelined ALU and control units; representative architectures. Exploratory non-von Neumann architectural models including: object-oriented, tagged, capability, dataflow and RISC designs. Prerequisites: CPSC 315 and 318. [3-1; 0-0]

421. (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. CPSC 320 is recommended. [3-0; 0-0]

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.

499. (0) *Co-operative Work Placement V.*—Approved and supervised technical work experience in the computing industry 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 Computer Science. Prerequisite: CPSC 399.

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 421 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 310) 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 310) 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 310) 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: CPSC 320.

508. (1½) *Operating Systems.*—Principles and techniques for the design and implementation of operating systems, especially distributed operating systems and operating systems for parallel computer systems. The concept of object model applied to operating system design. Prerequisite: CPSC 416.

509. (1½) *Programming Language Principles.*—Comparative study of language constructs; effects on implementation.

510. (1½) *Multigrid and Multilevel Methods.*—Numerical methods based on multi-level resolution for solving large, sparse systems with an appropriate local structure. Practical and theoretical aspects investigated. Prerequisite: CPSC 302.

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 and algorithms — geometrical relationships between points, lines, and surface in homogeneous coordinates, hidden surface removal, scan conversion, illumination, and shading, textures, colour. Geometric modelling — Bezier polynomials, B-splines; three-dimensional surfaces, parametric, Coons, Bezier, and B-spline patches. Solid Geometry — Boolean regularized operations, representation schemes. (This course is the same as Electrical Engineering 593.)

517. (1½) *Sparse Matrix Computation.*—Algorithms for computational solution of basic numerical linear algebra problems applied to large sparse matrices. Solution of large sparse linear systems by direct and iterative methods; application to linear least squares problems; computation of eigenvalues and singular values of large sparse matrices.

518. (1½) *Computer Systems Performance Evaluation.*—Basic computer performance evaluation techniques of measurement, simulation and mathematical modeling. Applications to performance improvement, computer selection, planning and computer design. Prerequisite: CPSC 315.

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 419 or consent of instructor.

520. (1½) *Numerical Solution of Differential Equations.*—Finite difference and finite element methods for time-dependent partial differential equations. Explicit and implicit schemes, stability and accuracy considerations, choice of boundary conditions, efficiency of computation, special schemes for particular linear and nonlinear equations. Prerequisite: CPSC 403.

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 310) 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.

527. (1½) *Computer Communication Protocols.*—Fundamentals of computer communications and OSI lower level protocols. Higher level protocols: transport, session, presentation and application layers. Introduction to formal techniques for protocol specification, verification and testing. Prerequisite: CPSC 417.

528. (1½) *Formal Techniques for Communication Protocols.*—Current development in higher level protocol standards. Formal description techniques (FDTs). Methods and tools for protocol implementation, testing, and verification/validation. Prerequisite: CPSC 527.

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 synthesis, 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: advanced architectures; distributed systems; performance analysis; protocol and 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.*—Various topics not covered in specific graduate courses in numerical computation.

549. (3/6)**c** *Thesis for Master's Degree.*

649. *Thesis for Ph.D. Degree.*

Computing Studies Education (CSED)

(Faculty of Education)

314. (2) *Curriculum and Instruction in Computer Studies: Secondary.*—Curriculum organization in computer science; principles and methods of instruction applied to teaching computer science. Prerequisite: a completed concentration in computer science or permission of the Head. Corequisite: Education 311. [2-4; 0-0]

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]

402. (1½) *Professional Use of Microcomputers for Teachers.*—Principles and techniques of using microcomputers to improve teaching performance and classroom administration. Students will use word-processors, spreadsheets, graphics utilities, data base programs, and other software useful to teachers. [3-1; 0-0] or [0-0; 3-1]

404. (1½) *Curriculum and Instruction in Computer Studies (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]

420. (1½) *Computers for Instruction (with BASIC).*—Instructional applications of microcomputer programs in a variety of subject areas; writing educational programs in BASIC. [3-2; 0-0] or [0-0; 3-2]

422. (1½) *Computers in the Elementary School (with LOGO).*—Instructional applications of microcomputer programs in the elementary school; writing educational programs in LOGO. [3-2; 0-0] or [0-0; 3-2]

424. (1½) *Computers in the Secondary School (with PASCAL).*—Instructional applications of microcomputer programs in the secondary school; writing educational programs in PASCAL. [3-2; 0-0] or [0-0; 3-2]

450. (1½) *Development of Educational Software.*—The software development process; principles and techniques for effective communication with a microcomputer; formative software evaluation. Students will design and develop an instructional package. Prerequisite: one of Computing Studies Education 420, 422, or 424. [3-2; 0-0] or [0-0; 3-2]

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 (CNPS)

(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 theoretical 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 362, 365.

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 (CRWR)
(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) and an 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 15 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 given through workshop and individual tuition. [0-3; 0-3]
404. (3) *Writing of Drama and Features for Radio.* [0-3; 0-3]
405. (3) *Creative Forms and Techniques of Non-Fiction.*—The use of literary techniques in the writing of non-fictional forms such as personal essay and memoir, biography, autobiography, travelogue, popular history, and miscellany. Projects range in length from magazine articles to books. [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. (Where a language department is regularly consulted on a project, the language adviser may assign marks equal to 1½ units of the course work.) [0-3; 0-3]
416. (3) *Applied Creative Non-Fiction.*—The application of the forms and literary techniques of Creative Non-Fiction to writing for a general audience in business, science, industry, law, culture, medicine, and other major areas of professional interest. Students will be assigned to stories and taught the use of basic research techniques such as the interview. Projects range in length from magazine articles to books. Prerequisite: Creative Writing 405. [0-3; 0-3]
439. (3) *Special Projects in Creative Writing.* [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-Fictional 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 and Features 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 and Features for Radio.*
505. (3) *Creative Forms and Techniques of Non-Fiction (Advanced).*
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.* (Where a language department is regularly consulted on a project, the language adviser may assign marks equal to 1½ units of the course work.)
516. (3) *Applied Creative Non-Fiction (Advanced).*
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.*
547. (3) *Directed Reading.*—May not be offered every year.
549. (3) *Thesis.*

Curriculum and Instructional Studies (EDCI)
(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 (CZVK)
(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)

Clinical Dental Sciences (CDSC)

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]

414. (1½) *Preventive Dentistry.*—Introduction to the concept of preventive dentistry as a philosophy of practice. Emphasis on the etiology of dental diseases and the measures available for their prevention with supporting material in nutrition, epidemiology, evaluation of dental literature and the development of dentistry as a health profession. [2-0; 2-0]

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) *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]

422. (1) *Paediatric Dentistry.*—An introductory course, including lectures, laboratory exercises and clinical paediatric dentistry.

423. (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 OMSS 425 strongly recommended. [0-0; 0-1½]

424. (½) *Professional Development.*—This course is a continuation of CDSC 414.

425. (2) *Prosthodontics.*—The course comprises lectures, laboratory exercises and clinical demonstrations in fixed and removable prosthodontics.

430. (2) *Operative Dentistry.*—A clinical program applying the basic principles of restorative dentistry.

431. (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.

432. (2) *Paediatric Dentistry.*—A continuation of CDSC 422 with greater exposure to clinical paediatric dentistry.

433. (1½) *Periodontics.*—Lectures and clinical practice in periodontal therapy.

434. (1) *Community Dentistry.*—Dental public health programs in Canada and current issues facing the dental profession.

435. (2) *Prosthodontics.*—The course comprises lectures, laboratory exercises, clinical demonstrations and clinical practice in fixed and removable prosthodontics.

440. (1½) *Operative Dentistry.*—Advanced clinical application of the principles of operative dentistry and their role in comprehensive patient care.

441. (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.

442. (1) *Paediatric Dentistry.*—A continuation of CDSC 432.

443. (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.

444. (2) *Community Dentistry.*—A lecture and seminar course dealing with the socio-economic aspects of dentistry. Included in the course will be ethics, jurisprudence, practice management and intra- and interprofessional relationships.

445. (4) *Prosthodontics.*—Fixed and removable prosthodontics and dental materials. [1-9; 1-9]

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 CDSC 700.

710. *Periodontal Case Management.*—A one-term didactic course in 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.

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.

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.

Dentistry (DENT)

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 fractures.

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 (ORBI)

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, the principles of articulation, and occlusal considerations in clinical treatment. Instruction is provided by members of the Departments of Oral Biology and Clinical Dental Sciences.

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 in 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 of and access to the 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.

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 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 restricted 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 Medical and Surgical Sciences (OMSS)

421. (1) *Endodontics.*—This course covers basic endodontic theory, diagnosis and clinical technique.

422. (½) *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]

423. (½) *Oral Diagnosis.*—An introduction to the diagnostic process; history-taking, physical examination, collecting and interpreting information, and treatment planning. Clinical participation is included.

425. (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]

426. (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.

427. (½) *Local Anaesthesia.*—Didactic and clinic 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.

431. (½) *Endodontics.*—A clinical program applying the basic principles of endodontics.

433. (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.

434. (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.

435. (2) *Oral Pathology.*—Lectures, slide presentation 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]

436. (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.

437. (1) *Pain and Anxiety Control.*—Lectures, tutorials and clinical practice in the recognition, understanding and treatment of both pain and apprehension.

441. (1) *Endodontics.*—A continuation of OMSS 431 with greater exposure to clinical endodontic dentistry.

443. (½) *Oral Medicine and Oral Diagnosis.*—A continuation from OMSS 433, including didactic and clinical instruction on the nature, diagnosis, and treatment of diseases affecting the oral structures.

444. (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 observation of specialty practice is provided.

446. (½) *Oral Radiology.*—This course is designed to improve competence in radiographic techniques, and to extend the student's scope in radiological diagnosis.

448. (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.

713. *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.

716. *Oral Radiology.*—Seminars, tutorials and clinics to provide knowledge of radiographic technique and oral radiological interpretation.

Early Childhood Education (ECED)

(Faculty of Education)

333. (1½) *Prekindergarten Curriculum.*—The development of prekindergarten programs with reference to recent research, theories of early learning, and curriculum trends and practices. [3-0; 0-0] or [0-0; 3-0]

334. (1½) *Home, School, and Community Relations.*—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; 0-0] or [0-0; 3-0]

336. (1½) *History of Early Childhood Education.*—Political and social factors which influenced movements and trends in early childhood education in North America, prekindergarten through primary. [3-0; 0-0] or [0-0; 3-0]

343. (1½) *Prekindergarten Instruction.*—Planning and implementing prekindergarten learning experiences; resources, materials, guidance, curriculum integration, evaluation, scheduling, and classroom design. [3-0; 0-0] or [0-0; 3-0]

405. (1½) *Primary Curriculum.*—The development of programs in grades 1-3 with reference to recent research, curriculum trends, social and cognitive development, and issues in primary education. [3-0; 0-0] or [0-0; 3-0]

415. (1½) *Primary Instruction.*—Planning and implementing learning experiences in grades 1-3; resources, materials, guidance, curriculum integration, evaluation, scheduling, classroom design, and management. [3-0; 0-0] or [0-0; 3-0]

433. (1½) *Kindergarten Curriculum.*—The development of kindergarten programs with reference to recent research, theories of early learning, curriculum trends and practices, and the place of kindergarten in contemporary education. [3-0; 0-0] or [0-0; 3-0]

438. (1½) *Observation and Recording.*—Methods of observing and recording children's behaviour in early childhood settings. [3-0; 0-0] or [0-0; 3-0]

443. (1½) *Kindergarten Instruction.*—Planning and implementing kindergarten programs with reference to learning experiences, resources, materials, instruction, curriculum integration, evaluation, scheduling, and classroom design. [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.

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.*

Economics (ECON)

(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 Microeconomics I.*—Consumer behaviour, exchange, production and cost, equilibrium of the firm under different market structures, industry equilibrium. Prerequisites: Economics 100 and 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. Prerequisites: Economics 100 and either of Mathematics 140 or 111. Credit may be obtained for only one of Economics 202, 207, or 302. [3-0]

206. (1½) *Intermediate Microeconomics I.*—Consumer behaviour, production and cost, behaviour of the firm under different market structures, industry equilibrium. Introduction to duality theory. An enriched version of Economics 201. Prerequisites: second-class standing in Economics 100 or 309; second-class average in Mathematics 140 and 141 or equivalent; or permission of the Department. Credit may be obtained for only one of Economics 201, 206, or 301. [3-0]

301. (1½) *Intermediate Microeconomic Analysis.*—Consumer behaviour, production, exchange, theory of the firm under different market structures, factor markets, welfare economics. Prerequisites: Economics 100 or 309; also Mathematics 140 and 141. Credit may be obtained for only one of Economics 301, 201, or 206. Sections numbered in the 30s 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 or 309; also Mathematics 140 and 141. Credit may be obtained for only one of Economics 302, 202, or 207. Sections numbered in the 30s are reserved for graduate students. [3-0]

303. (1½) *Intermediate Microeconomics II.*—Factor markets, general equilibrium, uncertainty and information, contract theory, externalities, public goods, welfare. Prerequisites: Economics 201 or 206, and Mathematics 141. [3-0]

306. (1½) *Intermediate Macroeconomics II.*—Factor markets, general equilibrium, uncertainty and information, contract theory, externalities, public goods, welfare. An enriched version of Economics 303. Prerequisites: second-class standing in Economics 206 or permission of the Department. Credit may be obtained for only one of Economics 303 or 306. [3-0]

307. (3) *Macroeconomic Analysis.*—Income and employment theory, monetary and fiscal theory, the open economy, economic fluctuations, inflation and unemployment, growth theory, macro dynamics, rational expectation, and macro policy analysis. Intended for qualified students pursuing an Honours degree in Economics. Prerequisite: second-class in Economics 100 or 309; second-class average in Mathematics 140 and 141 or equivalent. Co-requisite (to be taken in the fall term if not completed earlier): Economics 201 or 206. This course is normally taken in the third year. Credit may be obtained for only one of Economics 202, 302, or 307. [3-0; 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 the instructor. Prerequisite: none. Credit may be obtained for only one of Economics 308, 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 be obtained for only one of Economics 309 or 100. [3-0; 3-0]

312. (1½) *Political Economy of Capitalism.*—An intellectual history of the evolution of the capitalist system and its institutions; a selection of defences and criticisms of capitalism and its alternatives in the writings of leading social and political philosophers from the 18th to the 20th centuries. Prerequisite: Economics 100 or 309. [3-0]

313. (1½) *Marxist Economics.*—Marxist critiques of capitalist systems and Marxian alternatives. The origin of exploitation; feudalism and capitalism; exploitation and profits; the morality of exploitation; the emergence of class; historical materialism; Marxist theories of imperialism; and public ownership of the means of production. Prerequisite: Economics 100 or 309. [3-0]

317. (1½) *Poverty and Inequality.*—Economic inequality in Canada and other countries; measurement and causes. Inequality in the distribution of wealth; redistribution of income and wealth; notions of distributive justice. Prerequisite: Economics 100 or 309. [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 or 309; also 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); also Mathematics 140 and 141. [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 or 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]

339. (1½) *Economics of Technological Change.*—Application of economic analysis to technological change; the impact of technological change on the growth and distribution of income; economic influences on the invention and diffusion of technology; the interaction between technology, work, skills, and education; public policy toward technological change. Prerequisite: Economics 100 or 309. [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 the gains from development. Each topic is discussed in the context of an 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]

343. (1½) *The Economic Development of Modern Japan.*—An Economic analysis of the growth and structural changes of the Japanese economy from the Meiji Restoration to the Second World War. Sources of growth, the development of new economic institutions, agricultural development, international trade and early industrialization, the emergence of a dual economic structure, war preparation, and the drive towards heavy industrialization. Prerequisite: Economics 100 or 309. [3-0]

345. (3) *Money and Banking.*—Financial markets and financial institutions in theory and practice; structure and development of the Canadian financial system; development and theory of the regulation of the financial system; process of monetary control; theory and history of central banking and monetary policy; the international financial system. Prerequisite: Economics 100 or 309. [3-0; 3-0]

350. (1½) *Public Finance Policy Topics.*—Examination of two or three selected policy problems from areas of taxation, income security, and public expenditures. Topics to be selected each year from areas of current or recent policy debate. Examples include public pension policy, privatization and public services, income tax or sales tax reform, federal-provincial cost sharing programs, tax incentives versus direct expenditures, welfare reform. Prerequisite: Economics 100 or 309. [3-0]

355. (1½) *International Economics.*—Introduction to international trade and finance, with an emphasis on international economic policy. Topics include the determinants of trade, balance of payments, and selected policy issues (which may vary from year to year) such as tariff and non-tariff barriers to trade, bilateral and multilateral trade disputes, trade liberalization, trade and development, capital mobility, political economy of protection, and exchange rate policy. Prerequisite: Economics 100 or 309. [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 or 309. Credit may be obtained for only one of Economics 360 or 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 or 309. Credit may be obtained for only one of Economics 361 or 461. [3-0]

365. (1½) *Topics in Canadian Industrial Organization and Regulation Policy.*—Current topics in industrial organization and regulation with emphasis on Canadian federal and provincial policy. The content will differ from year to year. Possible subjects include the regulation of transportation and communications, environmental regulation, marketing boards and other forms of agricultural regulation, competition and anti-combines policy, industrial organization and trade policy, and issues in consumer protection. Prerequisite: Economics 100 or 309. [3-0]

367. (1½) *Economic Analysis of Law.*—The economics of market failure, equity and efficiency. Property rights, the economics of accident and contract law, economic theories of law enforcement. Prerequisite: Economics 100 or 309. [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) *Economics of the Environment.*—Economics analysis applied to various environmental issues, including sustainable development, quality of life, and environmental impacts of specific industrial and consumption activities. The design and implementation of government policies. Global environmental effects of human economic activity. Prerequisite: Economics 100 or 309. [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]

406. (1½) *Topics in Microeconomics.*—Selected topics in advanced microeconomic analysis. Prerequisite: Economics 201 or 206 or 301. [3-0]

407. (1½) *Topics in Macroeconomics.*—Selected topics in advanced macroeconomic analysis. Prerequisites: Economics 201 and 202, or 206 and 207, or 301 and 302. [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 206 or 301. [3-0]

420. (1½) *Optimization and Economic Theory.*—An introduction to static and dynamic optimization methods with economic applications. Prerequisites: Economics 201 or 206 and Mathematics 200 and 221, or permission of the instructor. [3-0]

421. (1½) *Topics in Mathematical Economics.*—Selected topics in mathematical economics such as general equilibrium theory and game theory. Prerequisite: Economics 420 or permission of the instructor. [3-0]

422. (1½) *Mathematics for Economists.*—Provides 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. Restricted to students taking graduate economic theory courses. Prerequisites: Mathematics 140 and 141, or Mathematics 100 and 101. [3-0; 0-0]

425. (1½) *Introduction to Econometrics.*—Theoretical and applied issues in statistics and econometrics. Statistical distributions, sampling theory, maximum likelihood methods of estimation and hypothesis testing, generalized least squares, measurement errors, non-normal errors, systems of equations, discrete-choice models, outliers, regression diagnostics, and model selection. Prerequisites: Economics 325 and 326. [3-0]

426. (1½) *Econometric Analysis.*—Further topics in econometrics including such areas as: nonlinear estimation, distributed lag models, time-series analysis, time-varying parameters, multivariate analysis, simulation and forecasting models, Monte Carlo experiments, duration models, large econometric models, Bayesian statistics, asymptotic theory, and ergodic theory. Prerequisite: Economics 425. [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. Prerequisites: Economics 201 and 202, or 206 and 207, or 301 and 302; 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. Prerequisites: Economics 201 or 206. [3-0; 3-0]

444. (1½) *The Contemporary Japanese Economy.*—An economic analysis of selected issues in contemporary Japan. The postwar growth record, economic management and planning, industrial policy, labour market and industrial relations, foreign trade and investment, rapid industrialization and its consequences, external economic relations. Prerequisite: Economics 201. [3-0]

447. (1½) *Monetary Theory.*—Theoretical analysis of economies that use money. Topics may vary from year to year and may include: the emergence of money from barter; the roles of money in the economy; models of money demand; the optimal quantity of money seignorage and inflation; monetary policy and macroeconomic stability; monetary policy issues in an open economy. Prerequisites: Economics 201 or 206 or 301 and Economics 202 or 302 or 307. [3-0]

450. (1½) *Economics of Taxation.*—The economic analysis of taxation. Equity and efficiency; optimal taxation theory; partial and general equilibrium analysis of incidence; analysis of taxes such as the personal and corporate income taxes, sales and excise taxes, payroll taxes and property tax. Prerequisite: Economics 201 or 206 or 301. [3-0]

451. (1½) *Economics of Public Expenditures.*—The role of government in the economy; efficiency and economic justice. Theory of public goods; applications to topics such as education, medical care and social services. Pricing and investment rules for public enterprises. Prerequisite: Economics 201 or 206 or 301. [3-0]

455. (1½) *International Trade.*—International trade theory and policy, primarily using general equilibrium analysis. Topics include the role of relative costs, factor proportions, returns to scale and imperfect competition in determining the pattern of trade; efficiency and distributional effects of trade; theoretical and empirical analysis of trade policies; and an analytical approach to current problems and issues in international trade. Prerequisite: Economics 201 or 206 or 301. [3-0]

456. (1½) *International Macroeconomics and Finance.*—Balance of payments; market for foreign exchange; mechanism for adjusting the balance of payments; internal vs. external stability; current problems and issues. Prerequisites: Economics 202 or 207 or 302. [3-0]

457. (1½) *Seminar in International Economic Relations.*—Selected topics focussing upon various issues arising in international economic relations. Open only to fourth-year students in the Major program in International Relations. Prerequisite: Economics 100. [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, hiring, and promotion. Prerequisites: Economics 201 and 202, or 206 and 207, or 301 and 302. Credit may be obtained for only one of Economics 360 or 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, or 206 and 207, or 301 and 302. Credit may be obtained for only one of Economics 361 or 461. [3-0]

465. (1½) *Market Structure.*—Market structure and social welfare, theory of price discrimination, equilibrium in oligopolistic markets, entry and exit decisions, product differentiation and spatial models, theories of hierarchical organization, agency problem in the modern corporation, vertical integration and control, market structure and technical progress. [3-0]

466. (1½) *The Economics of Government Regulation of Business.*—Normative and positive theories of government regulation of business. Topics include natural monopoly, socially optimal monopoly pricing, regulation of multifirm industries, competition policy. Selected empirical studies. Prerequisite: Economics 201 or 206 or 301 and Economics 303 or permission of the instructor. [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 206 or 301. [3-0; 0-0]

472. (1½) *Economics of Renewable Resources.*—Application of economic analysis to the management of renewable resources. Special attention is given to criteria for the optimal use of depleting resources such as forests and water. Other topics include public policy with regard to environmental quality, conservation, and outdoor recreation. Prerequisite: Economics 201 or 206 or 301. [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 or 206 or 301; also 325 and 326 or Commerce 211 and 212. [3-0]

487. (1½) *Comparative Economic Systems.*—Economic analysis of non-market/non-price systems of resource allocation. Economic analysis of central planning, co-ordination problems in hierarchical organizations, and the role of quantity restrictions, quotas, standards, etc. in regulating economic behaviour. The Soviet system of economic planning is used throughout as an example of the issues discussed. Prerequisite: Economics 201 or 206 or 301. [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 206 and 207, or 301 and 302; also 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) *Microeconomics I.*

501. (1½) *Microeconomics II.*

502. (1½) *Macroeconomics.*

503. (1½) *Economic Fluctuations and Growth.*

514. (1½) *Information and Incentives.*

515. (1½) *Special Topics in Microeconomic Theory.*

516. (1½) *Special Topics in Macroeconomics.*

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.*

522. (1½) *Economic Applications of Game Theory.*

526. (1½) *Probability and Statistics for Use in Economics.*

527. (1½) *Econometric Methods of Economic Research.*

528. (1½) *Econometric Theory.*

529. (1½) *Topics in Theoretical Econometrics.*—The course content will vary from year to year, and may include, for example, time series models (both the RIMA and ARMAX models), spectral analysis, time varying parameters, the econometrics of rational expectations, latent variables, and random coefficients models. Prerequisite: Economics 527 or equivalent.

530. (1½) *Topics in Applied Econometrics.*—The course content will vary from year to year, and may include, for example, issues involved in the formulation and estimation of macroeconomic models, consumer demand models, labour supply functions, and cost and profit functions. Students will complete a major empirical project. Prerequisite: Economics 527 or equivalent.

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.*
580. (1½) *Social and Economic Measurement.*
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.*
640. (1½) *Ph.D. Research Seminar.*—Open to qualified students working primarily toward a thesis prospectus. Students will present regular progress reports on their research.
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 is available from the office of the Department.
699. *Ph.D. Thesis.*

Education (EDUC)

(Faculty of Education)—See also:

Adult Education
Art Education
Business Education
Computing Studies Education
Counselling Psychology
Curriculum and Instructional Studies
Early Childhood Education
Educational Administration
Educational Psychology and Special Education
Educational Studies
English Education
Higher Education
Home Economics Education
Industrial Education
Library Education
Mathematics Education
Modern Languages Education
Music Education
Physical Education
Reading Education
Science Education
Social Studies 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.) [3-0; 0-0]
143. (0) *Seminar and School Observation.*—Group guidance, counselling, and orientation to teaching, including half day observation in schools. [0-2; 0-2]
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. [0-0; 3-0]
244. (0) *Seminar and Classroom Observation.*—Implications of cultural studies for classroom organization and practices. Orientation to Indian educational practice, including some half day school observation and a 3 week May practicum. [0-2; 0-2]
306. (1½) *Curriculum and Instruction in Health Education.*—School health promotion programs and policies; child and adolescent health knowledge, attitudes, and behaviors; curriculum planning; teaching methods and strategies for grades K-12. [3-0; 3-0]
310. (3) *Principles of Teaching: Elementary.*—Introduction to principles and instructional procedures related to classroom management, instructional planning, and the assessment of learning as applicable across grade levels and subject matter fields. [4-3; 0-0]
311. (3) *Principles of Teaching: Secondary.*—Introduction to principles and instructional procedures related to classroom management, instructional planning, and the assessment of learning as applicable across grade levels and subject matter fields. [4-3; 0-0]
314. (2) *Curriculum and Instruction in Physical Education: Secondary.*—Curriculum organization in physical education; principles and methods of instruction applied to teaching physical education. Prerequisite: a completed concentration in physical education or permission of the Head. Corequisite: Education 311. [2-4; 0-0]
315. (0) *Pre-practicum Experience.*—Observation and instruction in educational settings. [0-4; 0-0]
316. (1½) *Communication Skills in Teaching.*—Study and practice of communication skills in educational settings. Candidates will be required to demonstrate satisfactory oral communication abilities. [1-3; 0-0] or [0-0; 1-3]
317. (1½) *Communication with Exceptional Students.*—Study and practice of communication skills in educational settings, with emphasis on the skills needed in dealing with exceptional students. Candidates will be required to demonstrate satisfactory oral communication abilities. [1-3; 0-0] or [0-0; 1-3]
319. (0) *Orientation School Experience: Secondary.*—A two-week sequence of observations and instructional assignments in a selected secondary school. Normally scheduled in November. Corequisite: Education 311.
320. (1) *Curriculum and Instruction in Physical Education: Elementary.*—Curriculum organization in physical education; principles and methods of instruction applied to teaching physical education. Prerequisite: Education 310. [0-0; 1-2]
321. (0) *Orientation School Experience: Elementary.*—A two-week sequence of observations and instructional assignments in a selected elementary school. Normally scheduled during Term 2 of the first year of the pedagogical program. Prerequisite: Education 310.
326. (1½) *Elementary School Physical Education: Curriculum.*—Physical education curricula for elementary school grades with reference to research, resources, and curriculum trends and practices. Prerequisite: Education 320. [3-0; 0-0] or [0-0; 3-0]
327. (1½) *Elementary School Physical Education: Instruction.*—Teaching approaches in elementary school physical education; philosophy, planning, implementation, and evaluation; resources and resource management; issues and research. Prerequisite: Education 320. [3-0; 0-0] or [0-0; 3-0]
328. (0) *Practice in Teaching: Elementary.*—Weekly assignments teaching reading and related content in an elementary school. Scheduled one-half day per week during Term 2, this course functions as the laboratory complement of Reading Education 320. [0-0; 0-3]
329. (9) *Extended Practicum: Secondary.*—A developmental program of teaching practice, normally in one B.C. secondary school. Candidates will teach the subjects for which they have been academically and pedagogically prepared. The assignment extends from mid-January until late April. Prerequisite: All requirements set for Term 1. [0-0; 0-40]
339. (1½) *Canadian Studies in the School Curriculum.*—Designed to improve teaching about Canada by integrating material from several disciplines. Criteria for selecting content, materials, and teaching approaches. Examination of significant teaching issues. Prerequisite: 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]
345. (0) *Native Curriculum Field Experience.*—Participation in the development and implementation of Native Indian curricula. Experience with appropriate implementation skills and strategies. This three-week May assignment is to a school or other Native educational setting.
380. (1½) *Teaching Adventure Activities in the Outdoors.*—An interdisciplinary focus will be used in methodology and program planning for teaching adventure activities in an outdoor environment. Field trips will provide opportunity for practical experience. [1-4; 0-0] or [0-0; 1-4]
395. (1½/3)**d** *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 Associate Dean (Teacher Education) 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.
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]
418. (9) *Extended Practicum: Elementary.*—A developmental program of teaching practice, normally in one B.C. elementary school. Candidates will teach all subjects in the elementary curriculum. The assignment covers the full school term from early September until late December. Prerequisite: all requirements set for Year 1. [0-40; 0-0]
420. (1) *School Organization in its Social Context.*—The organization and administration of schools, including issues in governance, finance, and community and professional control and influence. [0-0; 2-0]

432. (1½/3)**d** *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; 0-0], [0-0; 3-0], or [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. Teacher Education 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 Associate Dean (Teacher Education).

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.

495. (2-9)**c** *Teaching Practicum (Elementary)*.—Supervised teaching in a B.C. elementary school. For qualified teachers wishing to strengthen or expand areas of teaching competence and for those not enrolled in a full program of teacher education but requiring between 3 and 15 weeks of current teaching practice. Prerequisite: completion of recent elementary teaching methods courses in the subjects to be taught. [0-40; 0-0] or [0-0; 0-40]

496. (2-9)**c** *Teaching Practicum (Secondary)*.—Supervised teaching in a B.C. secondary school. For qualified teachers wishing to strengthen or expand areas of teaching competence and for those not enrolled in a full program of teacher education but requiring between 3 and 15 weeks of current teaching practice. Prerequisite: recent completion of secondary teaching methods courses in the subjects to be taught. [0-40; 0-0] or [0-0; 0-40]

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.

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*.

Educational Administration (EADM)

(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]

500. (1½) *The Study of Organizations and Administrative Behaviour in the Educational Context*.

501. (1½) *Research and Research Traditions in Educational Administration*.

502. (1½) *Problem Analysis and Formulation Skills for Administrators*.

505. (1½) *The Work of the School Principal*.

507. (1½) *Personnel Administration in Educational Organizations*.

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) *The Politics of Institutional Governance in Education*.

511. (1½) *Leadership in Educational Organizations*.

517. (1½) *Supervision of Instruction*.

520. (1½) *Advanced Topics in the Study of Organizations and Administrative Behaviour in the Educational Context*.

522. (1½) *Advanced Problem Analysis and Formulation*.

553. (3) *Seminar and Group Inquiry in Educational Administration*.

554. (1½) *Administration and Educational Policy Development*.

555. (1½) *Educational Finance*.

556. (1½) *Administration of the Educational Program*.

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.

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 and Special Education (EPSE)

(Faculty of Education)

301. (1½) *Introduction to Educational Psychology*. [3-0; or 3-0]

303. (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]

306. (1½) *Education during the Adolescent Years*.—Developmental characteristics of persons from pre-school age through adulthood. Physical, social, cognitive, moral, and emotional growth of both normal and exceptional children in grades 8 - 12. The teacher's role in assisting such students to deal with major developmental issues and problems. [3-0; 0-0]

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) *Educational Application of Developmental Theories*.—Theories of human development; developmental characteristics of persons from pre-school age through adulthood; implications for educational practice with students of different ages, including those with special educational needs. [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: Educational Psychology and 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: Educational Psychology and 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: Educational Psychology and 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: Educational Psychology and 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: Educational Psychology and 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.) Prerequisite: 1½ units of Mathematics and Mathematics Education 320. [3-0; 3-0]

322. (1) *Education during the Early Childhood Years.*—Physical, social, cognitive, moral, and emotional growth of both normal and exceptional children in kindergarten to grade 3. The teacher's role in assisting such students to deal with major developmental issues and problems. Pre- or co-requisite: Educational Psychology and Special Education 313. Credit will be given for only one of Educational Psychology and Special Education 322 and 323. [2-0; 0-0] or [0-0; 2-0]

323. (1) *Education during the Middle Childhood Years.*—Physical, social, cognitive, moral, and emotional growth of both normal and exceptional children in grades 4 - 7. The teacher's role in assisting such students to deal with major developmental issues and problems. Pre- or co-requisite: Educational Psychology and Special Education 313. Credit will be given for only one of Educational Psychology and Special Education 322 and 323. [2-0; 0-0] or [0-0; 2-0]

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. (1½/3)d *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: Educational Psychology and Special Education 312 and consent of the instructor [3-0; 0-0] or [0-0; 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]

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: Educational Psychology and 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: Educational Psychology and 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: Educational Psychology and Special Education 303. [0-0; 3-0]

410. (1½) *Microcomputer Technology in Special Education and Rehabilition.*—The use of microcomputers, adaptive technology, and software across age levels and areas of exceptionality in special education and health care settings. Prerequisite: Educational Psychology and Special Education 312. Pre- or co-requisite: Computing Studies Education 402. [2-1; 0-0] or [0-0; 2-1]

415. (1½) *Technology for the Visually Impaired.*—Aims to prepare teachers of the visually impaired to teach blind students to become independent readers with the Opticon, and other electronic reading devices as they are developed. Field experience in research and teaching of the Opticon is included. Pre- or co-requisite: Educational Psychology and Special Education 425. [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: Educational Psychology and 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: Educational Psychology and 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: Educational Psychology and Special Education 403. [0-0; 3-0]

421. (1½) *Assessment of Learning Difficulties.*—Theories of learning and instruction; principles and practices of diagnosis and assessment; special attention to research on motivation, retention, transfer, problem solving, and concept development as these relate to students with educationally relevant handicaps and special needs. Prerequisite: Educational Psychology and Special Education 322 or 323. Credit will be given for only one of Educational Psychology and Special Education 421 and 423. [0-0; 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) *Learning, Measurement and Teaching.*—Theories of learning and instruction; principles and practices in the assessment of classroom learning; special attention is given to research on motivation, retention, transfer, problem solving, and concept development. Prerequisite: Educational Psychology and Special Education 306, 322, or 323. Credit will be given for only one of Educational Psychology and Special Education 421 and 423. [0-0; 3-0]

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: Educational Psychology and Special Education 315. [0-0; 3-0]

425. (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]

426. (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: Educational Psychology and Special Education 312. [3-0; 0-0]

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]

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: Educational Psychology and 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: Educational Psychology and Special Education 316. [0-0; 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 and Special Education 301 or 423. [3-0; or 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]

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: Educational Psychology and 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: Educational Psychology and 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 auditory 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. Pre- or co-requisite: Educational Psychology and 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: Educational Psychology and Special Education 425. [2-2; 0-0] or [0-0; 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 and Special Education 461 and Reading Education 391/392 or 472/474 should take Reading Education 391/392 or 472/474 prior to Educational Psychology and Special Education 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 and Special Education 306 or 313. [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, experimental and other empirical 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 and Special Education 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 and Special Education 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 nonmajors. Prerequisite: EPSE 301 or equivalent. May be taken concurrently with EPSE 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: EPSE 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: EPSE 501 and 592.

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 EPSE 306, 313), 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.

507. (1½) *History of Special Education.*—A historical review of programs in special education in Europe and North America. Prerequisites: EPSE 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: EPSE 312.

510. (1½-3)**d** *Advanced Seminar in Microcomputer Applications in Special Education and Rehabilitation.*—Review and application of theory, current research, and technological development in micro-computer application and rehabilitation of individuals across age levels and areas of exceptionality. Prerequisite: EPSE 401.

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: EPSE 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: EPSE 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 are expected to be familiar with basic theoretical positions and methodologies concerning learning disabled individuals. Field work in applied research will be a course requirement. Prerequisites: EPSE 431 and 536 (EPSE 535 is also recommended).

528. (1½) *Basic Principles of Measurement.*—Test theory, including reliability, generalizability, validity and other psychometric topics. Prerequisite: EPSE 482 or 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: EPSE 528.

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: EPSE 423.

533. (1½) *Psychology of Handicapped Children.*—Physical, mental, social, and emotional characteristics of handicapped children (backward, crippled, hard-of-hearing, etc.). Prerequisite: EPSE 312.

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, WFPSI, WISC-R, and WAIS-R. The 1½ unit course will cover Wechsler or Stanford-Binet and other current tests. Consult instructor for current offerings.

537. (1½) *The Education of Multi-handicapped Children.*—Research and current practice in the education of children with multiple disabilities. Prerequisites: EPSE 448, 513 (may be concurrent) and 568.

538. (1½) *Seminar in Orientation and Mobility for the Blind.*—Theories of body image development and construction of spatial concept and applications to the teaching of orientation and mobility to blind persons.

539. (1½) *Seminar in the Education of the Visually Handicapped.*—Review of educational and developmental research studies of visually handicapped children. Prerequisite: EPSE 314.

546. (1½) *International Trends in Special Education.*—A problem orientation approach to the organization, legislative support, historical antecedents, prevailing theoretical orientation and practices of special education and their relationship to the general education system in developing and developed countries.

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: EPSE 431.

571. (1½/3)**c** *Seminar in Research in Education Psychology and Special Education.*—Prerequisite: EPSE 501 or approved senior course.

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.

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: EPSE 481 and 482.

584. (1½) *Human Development I.*—Theoretical bases and research findings related to changing self-processes during the years of formal education. Prerequisites: six units of courses dealing with human development and/or personality theory: e.g. EPSE 313, 505; Psychology 206, 305, 501, 513.

585. (1½) *Human Development II.*—Articulation and pursuit of research projects in motivation, learning to learn, attribution, self-concept and social cognition as they affect students' performance in school settings. Prerequisite: EPSE 584.

592. (1½) *Design and Analysis in Educational Research I.*—Analysis of variance and covariance with one covariate, including various analyses via linear contrasts. Prerequisite: EPSE 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: EPSE 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: EPSE 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.*

604. (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, automated instruction (including computer-assisted instruction), etc. Prerequisite: EPSE 502, 503 and 505 (1½).

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: EPSE 502 and 503. EPSE 682 recommended.

682. (1½) *Multivariate Analysis in Behavioural Research.*—Multivariate analysis of variance and covariance, discriminant analysis and canonical analysis. Prerequisite: EPSE 592 and familiarity with matrix algebra.

699. *Doctoral Thesis.*

Educational Studies (EDST)

(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]

314. (1½) *The Analysis of Education.*—Concepts, abilities, and procedures for assessing educational claims, policies, and practices. [3-0; 0-0]

425. (1½) *Educational Anthropology.*—Selected concepts from educational anthropology for teachers. Comparative study of school and classroom culture, school teaching, and multicultural education. [0-0; 3-0]

426. (1½) *History of Education.*—An examination of selected topics in the history of European, Canadian and American education and of the relationships between historical development and current educational policy. [0-0; 3-0]

427. (1½) *Philosophy of Education.*—An introductory course in which consideration is given to the philosophical foundations of education and to the practical bearing of theory upon curriculum content and classroom practice in our schools. [0-0; 3-0]

428. (1½) *The Social Foundations of Education.*—An application of the social sciences to the study of education. [0-0; 3-0]

429. (1½) *Educational Sociology.*—Selected theories of society and schooling applied to Canadian education. [0-0; 3-0]

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]

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. (1½-6)**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.

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.

578. (1½) *Multiculturalism, Race Relations and Education.*—Theoretical frameworks from the social sciences as they pertain to public education; various national policy responses to ethnic and racial pluralism, with particular reference to the relationship between education, ethnicity and public policy.

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. (1½/6)**c** *Doctoral Seminar.*

699. *Doctoral Thesis.*

Electrical Engineering (ELEC)

(Faculty of Applied Science)

***Not open to students in Electrical Engineering.**

251. (1½) *Circuit Analysis I.*—The fundamentals of analysis of lumped linear time-invariant circuits; network theorems; first and second-order circuits; transfer functions. [2-0-2; 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. Prerequisite: ELEC 251. [0-0-0; 2-0-2]

254. (1½) *Electronic Circuits I.*—Semiconductor fundamentals; modelling of electronic devices including diodes and transistors; design and analysis of non-linear electronic circuits including power supplies, wave shaping circuits, waveform generators and logic circuits. Prerequisite: ELEC 251. [0-0-0; 3-0-1]

256. (1½) *Digital Logic Design.*—An introduction to Boolean-Algebra and logical circuits. Realization of simple sequential machines and their use in digital systems. Elementary computer architecture. [2-0-2; 0-0-0]

259. (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. Prerequisite: ELEC 256. Credit given for only one of CPSC 213 and ELEC 259. [0-0-0; 2-0-2]

261. (1½) *Engineering Electromagnetics.*—Electrostatics, electric currents, dielectrics, capacitance, electrostatic potential, magnetostatics. [0-0-0; 3-0-1]

*263. (1½) *Basic Circuit Analysis*.—Ideal passive elements and sources; Kirchhoff's Laws; D.C. circuits; natural, forced and complete response of RLC circuits; impedance; phasors; complex power, resonance. Prerequisite: MATH 255. [2-2*-1; 0-0-0] or [0-0-0; 2-2*-1]

280. (1) *Electrical Laboratory I*.—Introduction to oscilloscopes, signal generators and electrical measuring instruments. Experiments in analog and digital logic circuits. [0-3-0; 0-0-0]

281. (1) *Electrical Laboratory II*.—Experiments involving electronic devices and circuits, electromagnetics and microcomputers. Prerequisite: ELEC 280. [0-0-0; 0-3-0]

315. (1½) *Introduction to Operating Systems*.—Introduction to batch, multiprogramming and time-sharing systems. Processing synchronization and communication. Main memory allocation techniques including virtual memory. Process scheduling. Deadlock avoidance and prevention. File organization and device management. Prerequisites: CPSC 210 and one of CPSC 213, or ELEC 259. Credit given for only one of ELEC 315 and CPSC 315. [3-0-1; 0-0-0]

320. (1½) *Design of Discrete Structures*.—Computer and digital logic applications of combinatorics, graphs, trees, sets and propositions; introduction to formal languages; analysis; design and hardware implementation algorithms. Prerequisites: ELEC 256 and CPSC 118. Corequisite: ELEC 259. [0-0-0; 2-0-2]

351. (1½) *Physical Microelectronics*.—Semiconductor fundamentals, physics of pn junction diodes, bipolar junction transistor and MOSFET transistor operation and analysis, introduction to VLSI. Prerequisites: ELEC 254 and 261. [2-0-2; 0-0-0]

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. Prerequisites: ELEC 253, ELEC 254. [2-0-2; 0-0-0]

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. Prerequisite: ELEC 253. [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. Prerequisite: ELEC 253. [0-0-0; 3-0-1]

364. (2) *Electromagnetic Fields and Waves*.—Maxwell's equations; field calculations; plane waves; TEM transmission lines; guided waves; cavity resonators; radiation and propagation. Prerequisite: ELEC 261. [0-0-0; 3-0-2]

*365. (1½) *Applied Electronics*.—Characteristics of transducers and electronic devices; analysis and realization of electronic circuits such as power supplies, amplifiers and logic circuits. Prerequisites: ELEC 263 or ELEC 251. [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 microcomputers. [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. [0-0-0; 2-3*-0]

*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. Prerequisite: ELEC 253 and one of ELEC 261 or PHYS 251. [2-0-2; 0-0-0]

372. (1½) *Rotating Machines*.—Design and analysis of dc, induction and synchronous machines. Use of stepper motors. Introduction to machine controls. Prerequisite: ELEC 371. [0-0-0; 2-0-2]

380. (2) *Electrical Laboratory III*.—Experiments involving physical electronics, electronic and power devices and circuits, signals and communications. Prerequisite: ELEC 281. [0-6-0; 0-0-0]

381. (2) *Electrical Laboratory IV*.—Experiments involving electromagnetics, rotating machines and control systems. Prerequisite: ELEC 380. [0-0-0; 0-6-0]

450. (1½) *Economic Analysis of Engineering Projects*.—Time-money relationships; economic analysis of alternatives including the effects of interest rates, inflation, depreciation, taxation and uncertainty; cost estimation and budgeting; financial analysis of engineering operations. [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

452. (1½) *Electrical Engineering Materials*.—Elementary aspects of structure and properties of materials relevant to device applications. Dielectrics, ferroelectrics, ferrites, metals. Prerequisites: ELEC 351 and one of ELEC 261 or PHYS 251. [0-0-0; 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. Prerequisites: ELEC 359, STAT 251. [2-0-2; 2-0-2]

456. (1½) *Computer Communications*.—Analysis, design and implementation of computer networks and their protocols. Queueing analysis, data link control, network design, routing, flow and congestion control. Satellite and packet radio networks. Local area networks. Prerequisites: MATH/STAT 205 or STAT 251, ELEC 313 or CPSC 313 or ELEC 358. Credit will be given for only one of CPSC 417 and ELEC 456. [3-0-1; 0-0-0]

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. Prerequisite: ELEC 360. [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. Prerequisite: ELEC 360. [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. Prerequisite: ELEC 372. [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. Prerequisites: ELEC 358 or ELEC 259, or the combination of ELEC 256 and CPSC 213. [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. Prerequisite: ELEC 359. [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. Prerequisite: ELEC 360. [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. Prerequisites: both ELEC 362 and ELEC 363; or PHYS 351 for Engineering Physics students. [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. Prerequisites: Both ELEC 362 and ELEC 363; or PHYS 351 for Engineering Physics students. [0-0-0; 2-0-2]

472. (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 351, 359, 367, 360, ELEC 452 (concurrent). [0-0-0; 2-3*-1]

474. (2) *Systems Laboratory I*.—Experiments on integrated engineering systems. Prerequisites: ELEC 367, ELEC 380, and either ELEC 381 or third year completion of ELCP program. [0-6-0; 0-0-0]

475. (2) *Systems Laboratory II*.—Experiments with advanced engineering systems. Prerequisite: ELEC 474. [0-0-0; 0-6-0]

476. (1½) *Introduction to Computer Architecture*.—Control unit structure and microprogramming, memory organization, input-output techniques, microprocessors. Introduction to supercomputer and beyond-Von Neumann architectures. Prerequisite: one of ELEC 259, ELEC 315, ELEC 358, or CPSC 315. Credit will be given for only one of CPSC 318 or ELEC 476. [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. Prerequisite: ELEC 252 or Physics equivalent. [2-0-2; 2-0-2]

478. (1½) *Computer Graphics*.—Physical and virtual input and output devices. The Graphical Kernel System: workstations, coordinate systems, output primitives, segments, attributes, input primitives, metafile, the GKS environment. Mathematics and algorithms: transformations, clipping, line generation, area fill. Representation of graphical data. Architecture of graphics systems. High-level graphical languages. Prerequisites: CPSC 213, or ELEC 259, or ELEC 358. (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. Prerequisites: both ELEC 362 and ELEC 363; or PHYS 351 for Engineering Physics students. [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]

493. (2) *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. Prerequisite: ELEC 372. [2-3*-2*; 0-0-0]

495. (2) *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. Prerequisites: ELEC 372 or ELEC 370. [0-0-0; 2-3*-2*]

498. (1) *Engineering Reports.*—Copies of specifications are issued by the Department and are available from the Department Office. Prerequisites: ENGL 100 and English Composition Test.

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) *Wave Propagation in Multiconductor Transmission Circuits.*—Application to power systems, microwave and communication circuits. 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. Includes project work. Prerequisite: ELEC 493 or equivalent.

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.

570. (1) *Advanced Industrial Process Control.*—Discrete time models; process control algorithms; control of systems with process delay; minimum variance control; parameter identification; Kalman filtering. For students in Pulp and Paper Engineering and other specializations using 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. (1) *Process Control Applications in the Pulp and Paper Industry.*—Control of paper machines, digesters and other pulp and paper process units.

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. (1½) *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. Includes three-hour weekly laboratory.

579. (1) *Topics in VLSI Design.*—A course in VLSI design with emphasis on microprocessor design. Top-down structured design methodology and the use of CAD tools will be illustrated through a class project. Prerequisite: ELEC 476 or equivalent.

580. (1) *Fabrication Technology of Semiconductor Devices.*—Theory and operation of high vacuum systems, vacuum deposition techniques, chemical deposition 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.

586. (1½) *High Voltage Engineering I.*—Generation of high dc, ac and impulse voltages and high impulse currents in research and test laboratories. Measurement techniques for high voltages, currents and electric fields. Transient voltages in distributed electrical networks. Diagnostic testing of high voltage apparatus.

587. (1½) *High Voltage Engineering II.*—Introduction to gaseous discharges. Electrical insulation of high dc, ac and impulse voltages in gaseous, liquid and solid media. Failure modes in practical insulation systems. Diagnostic techniques in electrical insulation research.

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.

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.*—Mathematics and algorithms — geometrical relationships between points, lines, and surfaces in homogeneous coordinates, hidden surface removal, scan conversion, illumination and shading, textures, colour. Geometric modelling — Bezier polynomials, B-splines; three-dimensional surfaces, parametric, Coons, Bezier and B-spline patches. Solid Geometry — Boolean regularized operation, representation schemes. Prerequisite: ELEC 478 or equivalent. (This course is the same as CPSC 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 (ENGL)

(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 One. [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 One. [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 One. [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 One. [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 One. [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 One. [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 One. [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 One. [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. Prerequisite: English 100 or Arts One. [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) *Technical and Business 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 One. [3-0]

302. (1½) *Advanced Practical Writing.*—Library research in the student's professional field; the writing of articles and research papers; detailed preparation of 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 One. [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. (1½-6)**d** *Studies in Rhetoric.*—Topics in rhetorical theories and their application. [3-0] or [3-0; 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. (1½-6)**d** *Studies in Poetry.*—Critical studies of representative English poems grouped according to form and content. [3-0] or [3-0; 3-0]

313. (1½-6)**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. (1½-6)**d** *Studies in Fiction.*—Special topics involving thematic, generic, or formal approaches to fiction. [3-0] or [3-0; 3-0]

315. (1½-6)**d** *Studies in Non-Fictional Prose.*—Special topics such as types of non-fictional prose, the prose of individual periods, or developments in prose style. [3-0] or [3-0; 3-0]

316. (1½-6)**d** *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] or [3-0; 3-0]

317. (1½-6)**d** *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] or [3-0; 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. (1½-6)**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]

321. (1½) *English Traditional Grammar.*—Traditional grammar from its origins to its codification in modern English grammars. [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. (1½-6)**d** *Studies in the English Language.*—Intensive study of some topic or aspect of English language. Specific topics will be announced each year. [3-0] or [3-0; 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. (1½-6)**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. (1½-6)**d** *Studies in Criticism and Bibliography.*—Topics in these fields, including criticism in individual periods, individual critics, and bookmaking and documentation. [3-0] or [3-0; 3-0]

337. (1½/3)**d** *The Literature of 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. (1½-6)**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. (1½-6)**d** *Studies in Shakespeare.*—Examination of particular aspects of Shakespeare's writing. Specific topics will be announced. [3-0] or [3-0; 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]

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]

383. (1½) *Restoration and Eighteenth-Century Drama*. [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. (1½-6)**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]

401. (1½) *Modern British Poetry*.—A study of major poets and poetic movements from 1910 to the Second World War. [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) *Twentieth-Century British Literature*.—Major figures and trends in British literature since 1914: Eliot, Yeats, Joyce, Lawrence, Forster, Waugh, Orwell, Auden, Thomas, and others. [3-0; 3-0]

411. (1½) *Contemporary British Poetry*.—A study of major poets and poetic movements from the Second World War to the present. [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** *Twentieth-Century 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. (1½-6)**d** *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] or [3-0; 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 writings 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. (1½-6)**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. (1½-6)**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. (1½-6)**d** *Studies in Literatures of the Commonwealth*.—Special topics, varying from year to year, including studies of individual authors, genres, and nations. [3-0] or [3-0; 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]

451. (1½-6)**d** *Studies in Literary Movements*.—Such literary movements as Naturalism, Realism, Imagism, Impressionism, Vorticism, and Modernism. [3-0] or [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. (1½-6)**d** *Studies in Bibliography*.

502. (1½-6)**d** *Studies in Criticism*.

503. (1½-6)**d** *Studies in Prose*.

504. (1½-6)**d** *Studies in Drama*.

505. (1½-6)**d** *Studies in Fiction*.

506. (1½-6)**d** *Studies in Poetry*.

507. (1½-6)**d** *Studies in the History of the English Language*.

508. (1½-6)**d** *Studies in the Structure of the English Language*.

509. (1½-6)**d** *Studies in Rhetoric and Theory of Composition*.

510. (1½-6)**d** *Studies in Old English*.

511. (1½-6)**d** *Chaucer*.

512. (1½-6)**d** *Middle English Studies*.

515. (1½-6)**d** *Shakespeare*.

519. (1½-6)**d** *Studies in the Sixteenth Century*.

520. (1½-6)**d** *Studies in the Seventeenth Century*.

525. (1½-6)**d** *Studies in the Eighteenth Century*.

530. (1½-6)**d** *Studies in the Romantic Period*.

535. (1½-6)**d** *Studies in the Victorian Period*.

539. (1½-6)**d** *Studies in the Twentieth Century*.

540. (1½-6)**d** *Studies in American Literature to 1890*.

541. (1½-6)**d** *Studies in American Literature Since 1890*.

545. (1½-6)**d** *Studies in Canadian Literature*.

546. (1½-6)**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.

555. (1½-6)**d** *Studies in Literature and the Other Arts*.

649. *Ph.D. Thesis*.

English Education (ENED)

(Faculty of Education)

313. (2) *Curriculum and Instruction in Theatre: Secondary*.—Curriculum organization in theatre; principles and methods of instruction applied to teaching theatre. Prerequisite: a completed concentration in theatre or permission of the Head. Corequisite Education 311. [2-4; 0-0]

314. (2) *Curriculum and Instruction in English: Secondary*.—Curriculum organization in English; principles and methods of instruction applied to teaching English. Prerequisite: a completed concentration in English or permission of the Head. Corequisite Education 311. [2-4; 0-0]

320. (1) *Curriculum and Instruction in Language Arts: Elementary.*—Curriculum organization in language arts; principles and methods of instruction applied to teaching language arts. Prerequisite: Reading Education 310. [0-0; 1-2]

333. (1½) *Primary Drama.*—A practical and theoretical study of the role of dramatic play in young children's education; principles and methods of instruction applied to teaching drama in kindergarten to grade 3; the application of drama to learning in the primary curriculum. (Credit may not be obtained for both English Education 333 and 335.) [3-0; 0-0] or [0-0; 3-0]

334. (1½) *Intermediate Drama.*—A practical and theoretical study of the use of drama in grades 4-7 as both a medium of instruction and a performance art. The application of drama to learning across the intermediate curriculum. (Credit may not be obtained for both English Education 334 and 335.) [3-0; 0-0] or [0-0; 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 Children's Literature in the Classroom.*—Canadian children's literature, both English and French (in translation), appropriate for use in schools; methods of using the cultural elements of such literature. 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. (1½) *Introduction to Teaching Children's Literature.*—Methods of teaching literature to children. The appraisal of books and authors for children. [3-0; 0-0] or [0-0; 3-0]

342. (1½) *Trends and Issues in Teaching Children's Literature.*—Controversial issues and new directions in children's literature. Prerequisite: English Education 341. [3-0; 0-0] or [0-0; 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 Students.*—An examination of the cultural backgrounds of major ethnic groups. Instructional techniques for meeting the needs of immigrant students 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 Head's permission. Corequisite: 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 Head's permission. Corequisite: 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]

426. (2) *Language Across the Curriculum: Secondary.*—Understanding the demands of the language diversity of the classroom and of the subject areas within the secondary school curriculum. Analysis of oral and written language from various curriculum areas; implications for learning and instruction. [0-0; 2-4]

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]

449. (1½/3)**c** *Supervised Study.*—Investigation of a particular problem in English Education. Supervised by a faculty member chosen by the student. Agreement of supervisor and approval of the Head required.

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 corequisite, 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] or [0-0; 3-0]

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: Linguistics 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: Linguistics 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 courses under Family Science, Family Studies, Home Economics, and Human Nutrition.

Family Practice (FMPR)

(Faculty of Medicine)

401. *Introduction to Family Practice.*—Correlation of basic medical and behavioural sciences to the Family Practice setting. Principles and skills of patient interviewing, history taking, physical examination are practised under supervision in office, home, hospital and community settings. Role of Family Physician in comprehensive patient care.

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. Prerequisites: ANAT 390 or ANAT 400 or equivalent, plus PHYL 301 or BIOL 353 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. Prerequisites: ANAT 390 or ANAT 400 or equivalent, plus PHYL 301 or BIOL 353 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 Science (FMSC)

(School of Family and Nutritional Sciences, Faculty of Arts)

200. (3) *Introduction to Family Science*.—A life span developmental approach, focussing on individual development in families, internal dynamics of family life, and the place of the family in North American society. [3-0; 3-0]

312. (1½) *Parent-child Relationships*.—Parent-child interaction as affected by family structure and social conditions. Impact of social change on parent-child interaction. Prerequisite: FMSC 200 or Psychology 100 or 200 or 206. [3-0]

314. (1½) *Development of Relationships*.—The empirically based study of the development, course, and decline of personal relationships over the life span. Emphasis will be on the internal dynamics of dyadic relationship development. Prerequisite: FMSC 200 or Psychology 100 or 200 or 206 or Sociology 240. [3-0]

316. (1½) *Human Sexuality*.—An examination of research and theory on selected topics in human sexual development and behaviour throughout the life span. Prerequisite: FMSC 200 or HMEC 310 or permission of the instructor. [0-3]

320. (1½) *The Contemporary North American Family in Societal Context*.—The contemporary North American family and marriage viewed from the developmental perspective. Transactions between the institution of the family and other societal institutions over the life span of the family. Prerequisite: FMSC 200 or Sociology 200. [3-0]

322. (1½) *Marital and Family Interaction in North America*.—Interactional processes within the family; special emphasis on marital interaction and its effects on children. Prerequisites: FMSC 200 or Sociology 200. [3-0]

324. (1½) *The Development of Family Careers*.—The paths Canadians follow through the life span and the relationships between family career, educational career, and occupational career. [3-0]

326. (1½) *Communication in the Family*.—Historical overview; theoretical and methodological issues in the study of communication in family settings. [3-0]

338. (1½) *Family Resource Management*.—Conceptual models of management; resource management concepts as related to family careers and to different family types. [3-0; 0-0]

340. (1½) *Family Financial Management*.—Major financial alternatives available to families during the various periods of the family career; financial decisions of families and their impact on family and individual well-being; use of current and future income (credit); purchasing of goods and services; providing financial security; organizations and laws which affect family financial decisions. [3-0]

342. (1½) *Family Consumer Patterns*.—Role and function of consumers in contemporary market economics; consumer socialization; factors affecting consumer choice as it varies at various periods of the life span for different family types. Prerequisite: Economics 100 or Economics 309 or three units of Psychology or Sociology. [3-0]

350. (1½) *Clothing and Human Behaviour*.—Human needs and the cultural factors which influence clothing consumption and use. Application of sociological and psychological theories that help to explain clothing behaviour of an individual, as a unique being and as a member of a group. Prerequisite or corequisite: six units in Sociology or Psychology. [2-1]

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 corequisite: Anthropology/Sociology 100 or permission of the instructor. [3-0; 0-0]

404. (1½/3)**d** *Family Sciences Seminar*.—Current developments in selected areas of Family Sciences. Open to third- and fourth-year students with permission of the instructor. [0-3]

410. (1½) *The Family Context of Human Development*.—The influence of family structure and dynamics on human development studied from a multi-disciplinary, theoretical perspective. Prerequisite: FMSC 200 or Psychology 301. [3-0]

414. (1½) *Aging and the Family*.—The family during the later stages of its career; topics include changing family dynamics, marital satisfaction, intergenerational relations, widowhood, grandparenthood, and remarriage. Prerequisite: FMSC 200 or Psychology 100 or 200 or 206 or Anthropology/Sociology 214. [3-0]

420. (1½) *Contemporary Theories in Family Analysis*.—Major theoretical approaches to the study of the family. Each approach is assessed for its strengths and weaknesses on the basis of empirical data. Prerequisite: FMSC 200 or Sociology 200. [3-0]

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: FMSC 200 and Statistics 203. Recommended: Statistics 204. [3-0]

436. (1½) *Family Life Education Over the Life Span*.—Examination of programs which educate individuals for present and future family roles; rationale, implementation, and evaluation of such programs; issues in training. Prerequisite: FMSC 200 and HMEC 310 or FMSC 312. [0-3]

440. (1½) *Families in the Canadian Economy*.—Forces in the Canadian economy which have an impact on families; inflation/recession, taxation, social assistance, and employment policies as these affect family income generation, adequacy, and security. Prerequisite: Economics 100. [3-0]

442. (1½) *Economic Roles of Women*.—Past and present economic roles of women; factors affecting participation in the labour force; occupational segregation, inequality, and discrimination; job satisfaction; women as volunteers and as consumers; labor force participation related to other roles of women. Prerequisite: three units from FMSC 200 or Women's Studies 222 or Sociology 200 or Psychology 100 or 206. [3-0]

464. (1½/3)**d** *Special Problems in Family Science*.—Current topics in a specific area of Family Science, based on original laboratory or field research.

474. (1½) *Directed Study in Family Science*.—Investigation of a problem, requiring a written or oral report of findings. Prerequisite: satisfactory standing and permission of faculty members supervising the investigation. Fourth-year Family Science students only.

Family Studies (FMST)

(School of Family and Nutritional Sciences, Faculty of Arts)

504. (1½-4½)**d** *Current Topics in Family Studies*.

520. (1½) *Theories About the Family*.—An examination of contemporary theories of the family. [3-0]

521. (1½) *Formulating Theories About the Family*.—Fundamental issues and techniques in formulating theories about the family. Prerequisite: FMST 520 or permission of instructor. [3-0]

522. (1½) *Research Methods in Family Studies*.—Designing research and collecting data for studying families. Prerequisite: FMSC 422 or equivalent. [3-0]

523. (1½) *Analyzing Data in Family Studies*.—Data analysis issues and computer applications in the study of families. Prerequisite: FMSC 422 or equivalent. [3-1]

524. (1½) *Family Development*.—An examination of research and theory on the timing and sequencing of the course of family life in North American families. [3-0]

525. (1½) *Interaction in the Family Setting*.—Selected aspects of marital, parental and intergenerational interaction. [3-0]

538. (1½) *Family Resources*.—Conceptual and empirical perspectives on family resource management. [3-0]

547. (1½-3)**c** *Directed Studies*.

549. (3/6)**c** *Thesis*.

Film—See Theatre.

Fine Arts (FINA)

(Faculty of Arts)

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 will not be granted 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 given to prospective Fine Arts B.A. Major and Honours, B.A. in Studio Arts, and B.F.A. students. [1-3; 1-3]

225. (1½) *Art in Europe to the Sixteenth Century*.—A selective survey of painting, sculpture, and architecture. Credit will not be granted for both Fine Arts 125 and Fine Arts 225 and/or 226. [2-1; 0-0]

226. (1½) *Art in Europe and North America from the Sixteenth Century to the Present*.—A selective survey of painting, sculpture, and architecture. Credit will not be granted 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]

Note: Admission to Fine Arts 281-290 requires an evaluation of a portfolio of works and, normally, an interview. This should be arranged with the Department of Fine Arts no later than March 31 of the preceding academic year. Students must register for 6 units of the following courses, among which must be Fine Arts 281. Students wishing fewer courses may register only at the end of the registration period and on a "space available" basis.

281. (1½) *Drawing*.—Basic skills in drawing, including life drawing. Required course for all prospective B.F.A. students and students in the B.A. Major program in Studio Arts. 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. 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. 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. 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. 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. 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. 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. 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. 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. 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 principal monasteries and cathederals 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 principal 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 includes 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) *Art in Canada.*—Art, artists, and art institutions from the establishment of the French and English colonies to the present; indigenous developments with particular attention to local *vs.* regional and national *vs.* international issues. [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 16th century A.D., 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]

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. Priority given to students enrolled in B.A. in Studio Arts, and B.A. Major and Honours students in Fine Arts. 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. Priority given to students enrolled in B.A. in Studio Arts, and B.A. Major and Honours students in Fine Arts. 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 articulation of space. Priority given to students enrolled in B.A. in Studio Arts, and B.A. Major and Honours students in Fine Arts. Prerequisites: Fine Arts 181 and three units of art history. [0-3; 0-3]

393. (3) *History of the Film.*—Study of the development of film from its origin to the present, including the pre-history of film, silent film, the introduction of sound, the major movements and film makers of the last ninety years. (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 the 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]

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. Readings in art theory and criticism. Entry restricted to students enrolled in the B.F.A. program. [0-3; 0-3]

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]
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 Reading*.
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 (FOOD)

(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 203 or 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, grading and quality; statistical quality control. Prerequisite: Plant Science 321 or equivalent. [0-0; 2-2]
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—Food Fabrication*.—Computer-aided techniques of optimization and multivariate analyses; chemistry of food ingredients. [2-2; 0-0]
402. (1½) *Food Process Science—Nutritive Aspects*.—The theory and practice of modification and evaluation of the nutritive properties and safety of preserved and fabricated food systems. Prerequisite: Animal Science 322 or Human Nutrition 203 or Human Nutrition 305. [0-0; 2-2]
404. (1½) *Food Analysis: Physical and Sensory Methods*.—Evaluation of physical and sensory attributes of food systems, including colour, odour, taste and texture; physiological basis of sensory perception; sensory analysis methodology. [3-2; 0-0]
405. (1½) *Seafood Process Science*.—Chemical, microbiological, physical and sensory factors important in the conversion of finfish, shellfish and crustaceans to food products. On-board handling of seafood resources. Post-mortem muscle changes. Low temperature and thermal preservation. Further processing of seafoods. Quality assessment methods for seafoods. Prerequisite: Chemistry 230. [0-0; 3-2]
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]
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) *M.Sc. 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 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.
512. (1) *Low Temperature Preservation of Food*.—Structure and properties of water and ice in food systems. Water activity of food. Metabolic processes and quality deterioration in fresh commodities during refrigerated storage. Physico-chemical and quality changes in frozen food. Process techniques for the chilling and freezing of food. Dynamics of freeze-drying. Prerequisites: Food 301 and 308 or permission of instructor. Not offered every year.
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*.
600. (1) *Ph.d. Seminar*.
649. *Ph.D. Thesis*.

Forest Harvesting (FORH)

(Department of Harvesting and Wood Science, Faculty of Forestry)

260. (1½) *Forest Engineering Economics*.— Detailed methods of planning and analysis of economic problems encountered in harvesting operations. Corequisite: Economics 100. [0-0; 2-2]
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. 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. This course should be taken in the week preceding beginning of lectures in second year and for five consecutive Saturdays.
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. Prerequisite: Physics 170; corequisite: Civil Engineering 230 or Wood Science and Industry 376. [2-2; 0-0]

362. (1½) *Timber Harvesting*.—Methods of planning, analysis and supervision of timber harvesting operations. Prerequisites: Forest Harvesting 260 and 262. [2-2; 0-0]

363. (1½) *Design and Construction of Forest Roads*.—Forest road location, design and construction. Topics include soil mechanics, turn layout, cut and fill calculations and geosynthetics. Prerequisite: Forest Harvesting 263. [0-0; 3-2]

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 362. [0-0; 2-2]

463. (2) *Engineering Structures for Forest Roads*.—Design and construction of structures for forest roads including bridges, retaining walls, piles and culverts. Prerequisites: Physics 236, Civil Engineering 230, or Wood Science and Industry 376. [3-2; 0-0]

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. Prerequisites: Physics 236; Forest Harvesting 262 or 364. [2-2; 0-0]

Forestry (FRST)

(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]

131. (1½) *Introductory Biometrics for Forestry*.—Basic theories of probability and statistics. Sampling distribution, methods of estimation and hypothesis testing; goodness of fit and tests for independence; analysis of variance, regression and correlation. Corequisite: Mathematics 100. [3-2; 0-0]

132. (1½) *Computer Applications in Forestry*.—Techniques involved in solving forestry problems with micro- and mainframe computers. Word processing, data base organization and spreadsheets; algorithm development and FORTRAN77 programming; introduction to statistical packages. [0-0; 3-2]

204. (2) *Forest Ecology and Silvics*.—The ecosystem concept; energy, biomass and nutrient cycling; the physical environment; population and community ecology; ecological succession. Ecological and silvical characteristics of the major tree species of B.C. The biogeoclimatic classification of B.C.'s forests. A plant herbarium of 50 vascular plants and 10 mosses required. Prerequisite: Soil Science 200. Corequisite: Foresty 111; Geography 204 highly recommended. [0-0; 3-4]

205. (1½) *Forest Ecology*.—The ecosystem concept: energy, biomass and nutrient cycling; the physical environment; population and community ecology; ecological succession. The biogeoclimatic classification of B.C.'s forests. A herbarium collection is required for entry into the course; details available from Department of Forest Sciences. Forestry 111, Soil Science 200 and Geography 204 highly recommended. (Not available for credit for students registered in the Forest Resources Management, Forest Science or Forest Harvesting Majors.) [0-0; 2-2]

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 131, 132. [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; Mathematics 101 or 141. [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]

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 204. [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 305. [0-0; 3-4*]

307. (½) *Forestry Vegetation Management*.—Theory of vegetation competition, principles of vegetation management, techniques employed — fire, mechanical scarification, manual slashing, chemical application. Impacts of vegetation management methods upon the short-term and long-term productivity of the ecosystem. Effect of vegetation management upon species, abundance of wildlife. Risks and hazards of herbicides. Concern for public health hazards. Prerequisite: Forestry 204; Corequisite: Forestry 305. [1-0; 0-0]

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 204. [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. [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. Applications of decision theory, quantitative planning methods and geographic information systems to management of timber and associated resources. Prerequisites: Forestry 305, 319; Corequisites: Forestry 238, 306. [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. Prerequisites: Soil Science 200, Forestry 204. [2-4*; 0-0]

332. (1½) *Introduction to Applied Mathematical Programming for Forestry*.—Decision analysis, critical path analysis and linear programming applied to forestry problems. Prerequisites: Mathematics 101, Forestry 131, 132. [2-2; 0-0]

333. (1½) *Advanced Mathematical Programming for Forestry*.—Dynamic programming, non-linear optimization techniques and simulation applied to forestry problems. Prerequisite: Forestry 332. [0-0; 2-2]

348. (1) *Forestry Technical Essay*.—Students entering Third Year are required to submit an essay of not less than 2000 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 mid-September. The final copy is due early November. Detailed instructions with appropriate dates are available from the Forestry office.

351. (1½) *Interior Field School*.—Seven working 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 Science 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 204; 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. [0-0; 3-2]

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) *The Sustainability of Production in Managed Forest Ecosystems*.—The functional and dynamic characteristics of forest ecosystems and their response to forest management. Assessment of the sustainability of net primary production and yield under changing management, soils, and climatic regimes using ecosystem-level microcomputer simulation models. Prerequisite: Forestry 204. [3-2; 0-0]

404. (2) *Advances in Silviculture*.—Fundamental silvicultural problems; the application of research findings to the practice of silviculture. Prerequisite: Forestry 305, 306. [0-0; 4-0]

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) *Advanced Forest Pathology*.—Hereditary, physiological, anatomical, environmental, and microbiological factors influencing forest tree diseases. Prerequisite: Forestry 309 (Given alternate years). [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 Biology 351, 352 or approval of instructor. [0-0; 3-2]

415. (1) *Forest Policy*.—The development, implementation and analysis of forest policy. Prerequisite: Forestry 306; 319 or Forest Harvesting 260. Corequisite: Forestry 325. [0-0; 2-1]

418. (1½) *Economics of Silviculture*.—The economic analysis of individual silvicultural practices and silvicultural regimes; capital budgeting in forest management; the economic impact of large scale reforestation and silvicultural programs; institutional incentives and disincentives for silvicultural investments. Prerequisites: Economics 100, Forestry 319 or Forest Harvesting 260, Forestry 305. Corequisite: Forestry 306. [0-0-; 3-0]

419. (1½) *Forest Industry Economics*.—Demand for and supply of timber and wood products; productivity, technical progress and economies of scale in forest industries; organization of forest industries; institutional incentives and disincentives for industry development — taxation, tenure arrangements. 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 131. [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. Prerequisites: Forestry 131, 132, 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 growth and yield projection and discussion of modelling approaches. Exploration of stand dynamics, quantitative implications of management treatments and environmental limitations to tree and stand growth. 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. (½-3)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*.—Eighteen 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. Given in alternate years commencing 1988-89. 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 or equivalent course in animal ecology. [2-2; 0-0]

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.

501. (1½) *Forest Tree Improvement*.—Identification and utilization of genetic variation in forests and forest trees. Prerequisites: Forestry 302, 430. Offered in 1987/88 and alternate years.

502. (1-3)c *Studies in Forest Genetics*.—Problems associated with forest tree improvement; analysis of variation in tree quality.

503. (1½) *Plant Molecular Biology Laboratory*.—Techniques of purification, cloning, sequencing, restriction-hybridization analysis of plant nucleic acids, in-vitro labeling of plant nucleic acids and proteins, and electrophoresis and immunodetection of plant proteins. Offered by the Biotechnology Teaching Laboratory in cooperation with the Department of Forest Sciences. Admission to the course is limited and requires recommendation from the Head of Department. Recommended pre- or corequisite: Biology 335. Same as Plant Science 540 and Botany 544.

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. (1½) *Advanced Forest Pathology*.—Hereditary, physiological, anatomical, environmental, and microbiological factors influencing forest tree diseases. (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.

511. (1) *Advanced Topics in Forest Regeneration*.—Ecological, physiological, and silvicultural problems in forest regeneration.

512. (1-3)c *Problems in Forest Soils and Tree Nutrition*.—Directed studies of forest soils and tree nutrition (see also Soil Science 503).

513. (1½) *Biotechnology in Tree Improvement*.—Advanced research topics and their application to forest genetics. Emphasis on molecular genetics and experimental protocols. Prerequisite: Biology 335 or consent of instructor. Offered in alternate years.

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.

560. (1½) *Advanced Analysis of Harvesting Operations.*—The application of advanced analytical methods to problems in harvesting. Development of proficiency in problem formulation, commercial software, and interpretation of results. Topics include linear, integer, non linear, and dynamic programming; classical optimization; simulation; bounding and search techniques.

561. (1½) *Modeling and Simulation of Harvesting Operations.*—Principles and methodology for performing simulation experiments. Emphasis is placed on building, running, and analyzing network-based simulation models applicable to many harvesting operations.

562. (1-3)c *Microcomputer Applications in Forest Engineering.*—Directed studies in analyzing microcomputer applications related to the planning, analysis and design of harvesting operations.

563. (1-3)c *Problems in Forest Engineering.*—Directed studies in planning and control of logging systems; special design problems of forest roads, bridges, cableways and associated structure.

564. (1½) *Research Methods in Forest Harvesting.*—A lecture and laboratory course covering the major research methods applicable to the study of forest harvesting operations. Topics covered include experimental design, production studies, and economic analysis.

565. (1½) *Transportation Network Planning.*—Determination of optimal road spacing road standards under assumptions of irregular cutting boundaries, non-uniform timber volumes, non linear cost functions, and multiple stand entries. Examination of large scale transportation network optimization.

566. (1½) *Mechanics of Ground Vehicles.*—Analysis of forces influencing the payloads and mobility of wheeled and tracked vehicles. Ground pressures and dynamics of the wheel-soil interface. Mechanics and energy transfers for engines, torque converters, transmission, differentials, and planetary gears.

567. (1½) *Advanced Cable Mechanics.*—Advanced topics in cable mechanics, including multispan systems, yarder mechanics, spar and tail-tree analysis.

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.

571. (1½) *Biodeterioration and Wood Protection.*—Recent advances in understanding the factors influencing the performance of wood in service. Topics will be selected from: bacterial and fungal degradation of wood, novel application technologies, accelerated testing of preservatives, factors influencing preservative performance. Prerequisites: Wood Science and Industry 371, 372, and 473.

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.

573. (1½) *Wood-fluids Relationships.*—A lecture and laboratory course in the relationships between wood moisture content and environmental, electrical and thermal properties. Theories of moisture sorption, hygroscopic swelling and shrinking, thermodynamics of moisture sorption. Steady-state, unsteady-state, isothermal and non-isothermal transport phenomena. Prerequisites: Mathematics 200, Wood Science 372.

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. (1½) *Advanced Wood Mechanics.*—Analysis and design of structural wood products, influences of material inhomogeneity and variability; creep and time dependent fracture phenomena; structural performance of wood products such as panel products, lumber, glued laminated timber and I-Beams. Impact of codes on marketing of structural wood products.

577. (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 377 and 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) *Wood Composites.*—Relationship of bulk and surface properties of wood to composite formation; influence of adhesive chemical and physical properties on bond performance. Processing strategies to enhance strength and durability of wood composites. Prerequisite: Wood Science 487.

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 (FREN)

(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.*—Course designed to provide opportunities for students to improve their oral French. Prerequisite: French 12 or French 100, or French 110 or permission of the Department. [4-1; 4-1]

120. (3) *Contemporary French: Language and Literature.*—Prerequisite: French 12, French 100, or French 110. [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. [3-1; 3-1]

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]

300. (3) *Introduction to Methods of Literary Analysis.*—A systematic introduction to problems and methods of literary criticism. Emphasis on the application of various analytical techniques to texts chosen from different genres. Required course for third-year Honours students specializing in literature; open to all students with French 220 or equivalent. [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 available for credit toward a Major or Honours program 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. Prerequisite: French 220 or French 202 or permission of the Department. [3-0; 3-0]

335. (3) *French-Canadian Civilization.*—A thematic approach to French-Canadian literary works considered in a broad cultural context. Prerequisite: French 220 or French 202 or permission of the Department. [3-0; 3-0]

340. (3) *French for Reading Knowledge, I.*—This course provides students having little or 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 available for credit toward a Major or Honours program in French and does not satisfy the language requirement of the Faculty of Arts. Not available for credit to students with French 12, French 100, French 110, or equivalent. [3-0; 3-0]

341. (3) *French for Reading Knowledge, II.*—This course provides students having some basic knowledge of French with a review of French grammar and vocabulary, to improve their ability to understand 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 available for credit toward a Major or Honours program in French. Available to students with French 12, French 100, French 110, French 120 or equivalent. Not available to students with French 202 or equivalent. [3-0; 3-0]

342. (3) *French Practice for Non-Specialists.*—French grammar, oral expression, reading skills, and short written compositions. Not available for credit toward 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 342. [3-1; 3-1]

344. (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 the Department. Not available for credit toward a Major or Honours program in French. [4-1; 4-1]

346. (3) *Commercial French.*—The essential vocabulary and style of French commercial correspondence and business texts. Not available for credit toward a Major or Honours program in French. Prerequisite: French 202 or 342 or permission of the Department. [3-0; 3-0]

352. (3) *Studies in French Language and Style, II.*—Composition, syntax, versification, advanced translation, and oral practice. Prerequisite: French 202. [3-1; 3-1]

354. (3) *French Applied Linguistics.*—The morphology and syntax of French as contrasted with English. Prerequisite: French 202. [3-1; 3-1]

356. (3) *Corrective 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]

400. (3) *A Survey of French Literature in Translation.*—Prerequisite: English 100 or Arts One and at least second-year standing. 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. Prerequisite: French 300 or permission of the Department. [2-0; 2-0]

403. (3) *Survey of French-Canadian Literature in Translation.*— Prerequisite: English 100 or Arts One and at least second-year standing. Not available for credit toward a Major or Honours program in French. [3-0; 3-0]

407. (3) *Medieval French Literature.*—Representative literary texts from the eleventh to the fifteenth century. Prerequisite: French 220. [3-0; 3-0]

408. (3) *Literature of the Sixteenth Century.*—The French Renaissance, including Rabelais, Ronsard, and Montaigne. Prerequisite: French 220. [3-0; 3-0]

409. (3) *Literature of the Seventeenth Century.*— Representative authors with emphasis on Corneille, Racine, Molière, Descartes, Pascal, and La Fontaine. Prerequisite: French 220. [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. Prerequisite: French 220. [3-0; 3-0]

411. (3) *Poetry and Drama of the Nineteenth Century.*—Representative works and significant trends. Prerequisite: French 220. [3-0; 3-0]

412. (3) *The Nineteenth-Century Novel.*—Representative texts and significant trends. Prerequisite: French 220. [3-0; 3-0]

414. (3) *Twentieth-Century Drama.*—Representative works and significant trends. Prerequisite: French 220. [3-0; 3-0]

415. (3) *The Twentieth-Century Novel.*—Representative works and significant trends. Prerequisite: French 220. [3-0; 3-0]

416. (3) *French-Canadian Literature.*—Characteristic works, from its origins to the present. Prerequisite: French 220. [3-0; 3-0]

417. (3) *Twentieth-Century French Poetry.*—Representative works and significant trends. Prerequisite: French 220. [3-0; 3-0]

418. (3) *African and Caribbean Literature in French.*—An introduction to representative works, with emphasis on *négritude*, the evolution of post-colonial literature, and the socio-historical context of each work. Prerequisite: French 220. [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. Prerequisite: French 220. [3-0; 3-0]

420. (1½-3)c *French Literature.*—Selected topics. Prerequisite: French 220.

421. (1½-3)c *French-Canadian Literature.*—Selected topics. Prerequisites: French 220, and 335 or 416.

425. (3) *Children's Literature of the French-Speaking World.*—A survey of fairy tales, legends, moral tales, adventure stories, picture books, and comics from socio-political, psychological, and aesthetic perspectives. Production and reception throughout the centuries; detailed examination of the contemporary corpus. Prerequisite: French 220. [3-0; 3-0]

450. (3) *Studies in French Language: Techniques of Communication.*—Study and practice in forms and techniques of communication in the contemporary language. Prerequisite: French 352. [3-0; 3-0]

452. (3) *Advanced Studies and Practice in French Language and Style.*—Sentence structure, stylistics, and translation. Prerequisite French 352. [3-0; 3-0]

456. (1½) *Advanced French Phonetics.*—Comparison of the phonetics and phonology of standard international French and Canadian French with English. Phonetic difficulties of standard French for the non-native speaker, and the phonetic modes that distinguish French from English. Prerequisite: French 356 or permission of the instructor. [3-1]

460. (1½) *Historical Phonetics and Phonology of French.*—Phonetic evolution from Latin to modern French. Emphasis on the Latin of northern Gaul and the origins of the phonology of modern French. Prerequisite: French 356 or 456. [3-0]

462. (1½) *Historical Morphology and Syntax of French.*—Development of grammatical forms from Latin, through medieval French, to the modern language. Prerequisites: French 202 and one year of Latin or permission of the instructor. [3-0]

464. (1½) *Historical Lexicology of French.*—Popular vocabulary, loan-words; relationship between lexicon and cultural history; the stages in the assimilation of neologisms; changes in meaning. Prerequisites: French 202 and one year of Latin or permission of the instructor. [3-0]

470. (1½-3)c *French Language.*—Selected topics. Prerequisite: at least French 202, but there may be others depending on the topic selected.

472. (1½) *Morphology of the French Language.*—The morphological markings of French (with emphasis on the verb) and their underlying semantic systems. Prerequisite: French 352. [3-0]

473. (1½) *Syntactic Description of the French Language.*—The syntactic markings of French (word order, agreement, pronominalization, etc.) and their underlying semantic systems. Prerequisite: French 352. [3-0]

475. (1½) *Canadian French: A Descriptive Approach.*—The phonetics, phonology, lexicon and syntax of spoken and written Canadian French. Prerequisite: French 352 and 356 (French 356 may be taken concurrently with the permission of instructor). [3-0]

478. (3) *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. Prerequisite: two years' study of each of two Romance languages or two years of one Romance language and one year of Latin. (Also listed as Linguistics 320 and Romance Studies 478.) [3-0; 3-0]

480. (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]

482. (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 484. Available only to students enrolled in the Diploma program in Translation. [3-0; 3-0]

484. (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 482. Available only to students enrolled in the Diploma program in Translation. [3-0; 3-0]

486. (3) *Seminar in Advanced Translation.*—Available only to students enrolled in the Diploma program in Translation. [3-0; 3-0]

489. (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.

499. (3-6)c *Honours Essay.*

500. (1½) *Methods of Bibliography and Research.*

501. (1½/3)c *Studies in the Literature of Medieval 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.*
519. (1½/3)**c** *The Language and Literature of Old Provençal.*
520. (1½-6)**d** *Studies in French Literature.*
521. (1½/3)**d** *Studies in the Literature of the French-Speaking World.*
540. (1½/3)**d** *Studies in French and Comparative Stylistics.*
556. (1½-6)**d** *Studies in French Language.*
560. (1½/3)**d** *Studies in French Phonetics and Phonology.*
561. (1½/3)**d** *Studies in French Morphology.*
562. (1½/3)**d** *Studies in French Syntax.*
564. (1½/3)**d** *Studies in French Lexicology.*
566. (1½/3)**d** *Studies in French Semantics.*
575. (1½/3)**d** *Studies in Canadian French.*
576. (1½/3)**d** *Studies in Gallo-Romance Dialectology.*
578. (1½/3)**d** *Studies in Romance Philology.*
599. (3-6)**c** *Master's Thesis.*
699. *Ph.D. Thesis.*

Genetics (GENE)

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 and 335 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 and 335 or equivalent and a third year course in Biochemistry.
549. (3/6)**c** *M.Sc. Thesis.*
649. *Ph.D Thesis.*

Geography (GEOG)
(Faculty of Arts)

Notes:
1. Students registered in the B.Sc. program in Geography may receive Arts credit for no more than two of the following courses: Geography 190, 220, 260, 324, 327, 328, 329, 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.
2. * 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]

120. (3) *Geographical Change in the Modernizing World.*—An introduction to the human geography of the modern world, stressing major themes of economic, environmental, political, and cultural geography that underlie the landscapes we know and differentiate them from what existed before. Comprehensive analyses of the changing geographies of modernizing societies in Europe, Canada, Latin America, and Asia. Credit will be given for only one of Geography 120 or 220. [3-1; 3-1]

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]

*200. (1½) *The Atmosphere.*—An introduction to the atmospheric variables and the processes governing their distributions. Atmospheric energy, moisture, and motion on all scales (micro- to planetary). Prerequisites: Geography 101 or the first year of a B.Sc. degree. (Same as Atmospheric Science 200.) Credit will be given for only one of Atmospheric Science 200/Geography 200, or Geography 204/Soil Science 204, or their predecessors Geography 202 and 214. [3-2; 0-0]

*204. (1½) *Forest and Agricultural Climatology.*—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 204.) Credit may not be obtained for both this course and Atmospheric Science/Geography 200 or 300, or their predecessors prior to September 1988, Geography 202 or 212. Forestry, Arts and Science students register in Geography 204. [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 200 and Physics 110, 115 or 120. Credit will be given for only one of Geography 205 or its predecessors Geography 305 or 313. [0-0; 3-2]

*207. (1½) *Geography of Ecosystems.*—Landscape ecology, emphasizing the vegetation component of ecosystems; their spatial distributions and interactions; the effects of disturbance and management. Data sources, including historical records. Regional examples will be emphasized. Prerequisite: Geography 101 or permission of the Head of the Department. [0-0; 3-2]

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 Europe, Canada, Latin America, and Asia. Credit will be given for only one of Geography 220 or 120. [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]

*300. (1½) *Weather and Climate.*—Application of meteorological principles to the study of weather and climate on all scales. Air masses, fronts, upper air waves, and their influence on surface weather. Meso-scale circulations and regional climate. Local and microclimates. Climates of Canada. Climatic change. Prerequisite: Geography 101 or Atmospheric Science/Geography 200. (Same as Atmospheric Science 300.) [0-0; 3-0]

*301. (1½) *Atmospheric Energetics.*—Radiative transfer and thermodynamic theory applied to the Earth-Atmosphere system. Exchanges of short- and long-wave radiation between the atmosphere and the surface. Behaviour of dry and moist air. Static stability, mixing and thermodynamic diagrams. Prerequisite: Atmospheric Science/Geography 200 or one of Physics 156, 213, Geophysics 221. (Same as Atmospheric Science 301.) [3-0-2; 0-0-0]

*302. (1½) *Atmospheric Phenomena.*—Physical basis of cloud, precipitation, and other atmospheric phenomena. Cloud dynamics and microphysics. Processes of droplet/ice particle growth producing precipitation. Severe weather. Atmospheric electricity, optics and acoustics. Prerequisite: Atmospheric Science/Geography 301 or a 200-level course in Physics or Geophysics. (Same as Atmospheric Science 302.) [0-0; 3-0]

*303. (1½) *Methods in Atmospheric Science.*—An introduction to instrumentation used in monitoring the state of the atmosphere; a brief survey of methods of analysis of meteorological data. Prerequisite: Atmospheric Science/Geography 200, Computer Science 111. (Same as Atmospheric Science 303. Credit may not be obtained for both this course and its predecessor prior to September 1988, Geography 409.) [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. Prerequisite: Geography 101 or Geology 105. Credit will be given for only one of Geography 306 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 the Head of the Department. (Same as Soil Science 308.) [0-0; 3-2]

*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 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 register for the course at the beginning of their third year. Prerequisites: Geography 200 (or 204) and 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 the Head of the 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 the Head of the 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 the Head of the 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 United States. Prerequisite: Geography 120 or 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 120 or 220, or permission of the Head of the Department. [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 120 or 220 or 260; also open without this prerequisite to Major 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 available for credit to students registered in either Science or Applied Science, nor to 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 120 or 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 120 or 220 or 260, or permission of the Head of the Department. [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 120 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 economies. 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 120 or 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) *Geographic Data Analysis.*—Introduction to geographic techniques. The course will cover the major sources of geographic data and their storage, manipulation, analysis and display. Prerequisite: Geography 101. [2-2; 0-0] or [0-0; 2-2]

371. (1½) *Research Techniques in Geography.*—Methods for observing, recording and analyzing data; research methodologies with emphasis on behavioural research in geography. Prerequisite or corequisite: Geography 370. [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]

373. (1½) *Air Photograph Analysis.*—Aerial photography; measurement from aerial photographs; photo-interpretation in geographic analysis; remote sensing of the earth's surface and atmosphere. Credit may not be obtained for both Geography 373 and its predecessor prior to September 1988, Geography 370. Prerequisite or corequisite: Geography 370. [2-2; 0-0]

374. (1½) *Statistics in Geography I.*—Introduction to statistical techniques and their application to geographical problems. Prerequisite or corequisite: Geography 370. [3-0; 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 or corequisite: Geography 370. [0-0; 2-2]

380. (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, Indonesia, China, and Japan. [3-0]

385. (1½) *Geography of China.*—An introduction to the changing cultural, social and economic geography of China. Prerequisite: Geography 120 or 220 or permission of Head of Department. [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 modification, etc.) and their significance. Models of the urban atmosphere. Prerequisite: Atmospheric Science/Geography 200 or 300 or permission of Head of Department. [0-0; 3-0]

*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. Prerequisite: Atmospheric Science/Geography 200 and 300 or permission of Head of Department. [2-2; 0-0]

*403. (1½) *Global Climate and Climate Change.*—The global climate system. Climates over the geological, historical and instrument periods. Theories of climatic change. Monitoring and modelling the climate system. Impacts of change on environmental and socio-economic systems. Prerequisites: Atmospheric Science/Geography 200 and 300 or permission of the Head of Department. [0-0; 3-0]

*405. (1½) *Fluvial Geomorphology.*—Introduction to open channel flow and sediment transport. River morphology and channel types. Palaeohydrology. The development of channel networks. (405/406 given in alternate years.) Prerequisite: Geography 306. [0-0; 2-2]

*406. (1½) *Hillslope Geomorphology.*—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 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.

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 analysis of the changing settlements, spatial economies, and regions of British Columbia from European contact to 1930. Field trips. [2-1; 1-2]

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 will be given for only one of Geography 407 and 448.

*449. (1½/3)**d** *Honours Essay.*—Carries 3 units Arts credit for students in the Faculty of Arts and 3 units Science credit for students in the 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 Geographic Analysis.*—Analysis of the political organization of space at selected geographic scales (international to urban); development of political policy, organization, and behaviour, and their locational consequences; decision making and conflict resolution. Prerequisite: Geography 329 or 350 or permission of instructor. [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, Public Policy and Regional Development.*—Analysis of regional development policies in Western, Socialist, and Third-World contexts: theoretical foundations, problems of implementation, and consequences. Regional impact of national economic policies and political-economic structures. Prerequisite: any of Geography 360 to 363, or permission of instructor. [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]

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 120 or 220 permission of Head of Department. [2-2; 0-0]

472. (1½) *Geographic Information Systems.*—Cartographic modelling, digital terrain models, spatial interpolation, automated cartography, and other theoretical aspects of Geographic Information Systems. Limited enrolment. Prerequisite: Geography 370 (*Geographic Data Analysis*) or permission of Head of Department. [2-2; 0-0]

473. (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. Credit may not be obtained for both Geography 473 and its predecessor prior to September 1988, Geography 470. Prerequisite: Geography 370 or permission of Head of Department. [0-0; 2-2]

481. (1½) *Geography of Japan.*—A critical analysis of significant human adaptations to changing ecological conditions in the Japanese archipelago. Prerequisite: Geography 120 or 220 or permission of the Head of the Department. [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 120 or 220 or permission of Head of Department. [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 120 or 220 or permission of the Head of the Department. [0-0; 3-0]

490. (1½) *Seminar in Geography and International Relations.*—Topic will change from year to year: see brochure of the Program in International Relations, or Geography 3rd and 4th Year Course Guide, both issued in the spring preceding the course offering. (Primarily intended for fourth-year students in the Major program in International Relations.) [0-3]

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.

*501. (1½) *Processes in Geomorphology.*—Theoretical and empirical analyses of the major processes of landscape evolution with particular emphasis on fluvial and glacial processes and mass movement.

*502. (1½) *Boundary-Layer Meteorology.*—Theoretical and empirical analysis of the atmospheric boundary layer with particular emphasis on energy and mass exchanges near the Earth's surface.

*503. (1½) *Topics in Geomorphology and Hydrology.*—Topics (chosen to fit student needs in any given year) include: experimental methods and scale problems in geomorphology and hydrology; runoff, sediment, and solute source analysis; watershed mass balance and management.

*504. (1½) *Topics in Climatology.*—An introduction to the historical context, theory, and methods associated with current research topics in climatology. Topics chosen to fit the needs of the students in any given year.

*505. (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. Patterned ground.

*507. (1½-3)**c** *Directed Studies in Physical Geography.*

*508. (1½/3)**d** *Advanced Seminar in Geomorphology.*

*509. (1½/3)**d** *Advanced Seminar in Climatology.*

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.

516. (1½) *Advanced Geographic Information Systems.*—The structure of geographic data bases. Evolution of cartographic data structures. Applications in geography.

520. (1½) *Human Geography.*—Themes and interpretive issues in modern human geography.

521. (1½) *The Conduct of Geographical Inquiry.*—Methodological concepts and problems in scientific and humanistic geography.

*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. (Same as Oceanography 526.)

530. (1½) *Urban Social Geography.*—An examination of empirical research in social urban geography, including such topics as the geography of social problems, the quality of life, the geography of minority groups, migration, tourism, and the experience of place.

531. (1½) *Urban Systems in Developed Countries.*—Analysis of changing urban systems, with examples drawn primarily from Canada, the United States, and the United Kingdom.

532. (1½) *Urbanization in Developing Countries.*—Problems of urbanization in developing countries as illustrated by Asian case studies.

533. (1½) *Urban Political Geography.*—The spatial structure of local government in urban areas; location conflict; voting patterns; environmental quality and urban policy making.

534. (1½/3)**d** *Economic Geography.*—Recent literature on the spatial organization of economic activity.

535. (1½) *Geography of Regional Development.*—Theories of the geography of economic development. Examples of regional economic development and development policy from Europe and North America.

536. (1½/3)**d** *Cultural Geography.*—Theories of culture and methods of cultural geography applied either to the cultural ecology of subsistence systems or to the geography of advanced societies.

537. (1½) *Historical Geography of New World Societies.*—Geographical issues associated with the European settlement of the New World; an evaluation of the literature and of research strategies.

538. (1½) *Historical Urban Geography.*—Social and economic geography of early Canadian and American cities.
539. (1½/3)**d** *Topics in Human Geography.*
550. (1½/3)**d** *Directed Reading in Human Geography.*
555. (1½/3)**d** *Advanced Seminar in Regional Geography.*
556. (1½/3)**d** *Advanced Seminar in Human Geography.*
599. (6) *Master's Thesis.*
699. *Ph.D. Thesis.*

Geological Sciences (Faculty of Science)

Note: Geology 150 is a co-requisite for GEOL 200 whereas for all other Geology courses, except Geology 310, Geology 150 (or 105 or 125) is prerequisite. Students taking courses in Geological Sciences may be required to participate in field trips.
**Additional fees are charged for these courses. See Index "Fees — Special Fees".

Geology (GEOL)

105. (3) *Introductory Geology.*—Origin and structure of the planet; plate tectonics as the driving force of volcanoes, earthquakes, mountain belts, and movement of continents; shaping of the earth's surface through erosion, sedimentation and deformation; geologic history and the development of life; earth resources including metals, coal, petroleum and water; geologic aspects of resource depletion, waste disposal, environmental protection and natural hazards. Laboratory topics include crystals, minerals, rocks, fossils and field study. [3-2-0; 3-2-0]
125. (1½) *Evolution of the Earth.*—Origin of the earth; nature and origin of igneous, sedimentary and metamorphic rocks; deformation of the crust; geologic time, earth surface processes and related environmental issues. Laboratories include mineral and rock identification, structural geology, and a field trip. Primarily intended for students in the Faculty of Science, as a companion to Geophysics 120. [3-2-0; 0-0-0]
150. (1½) *Earth Science for Engineers.*—Focuses on the intelligent interaction between society and the geologic environment. Locating, assessing and developing natural resources; understanding and preparing for natural hazards; design of structures and waste disposal sites. For Applied Science and Forestry students only. [3-2-0; 0-0-0]
200. (1½) *Mineralogy I.*—Introduction to crystallography, physical and chemical properties of minerals. Recognition and identification of common minerals. Prerequisites: Chemistry 110, 120 or 151; Physics 110, 115, 120 or 153. Pre- or co-requisite: Geology 105, 125 or 150. [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. [0-0-0; 2-3-0]
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. Scheduled on weekend days during the Spring Term. Prerequisite for Geology 335 (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.*—Study of introductory level photogrammetry, airphoto interpretation and terrain analysis. Prerequisite: Geology 206 or 256 and Geography 306 or Geology 351. [0-0-0; 2-3-0]
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 Geological Engineering. Credit will not be given for Geology 308 and 200. [2-2-0; 0-0-0]
309. (1½) *Mineralogy II.*—Introduction to the crystal chemistry of minerals, and to X-ray diffractometry (powder and single-crystal), scanning and transmission electron microscopy, electron probe microanalysis, and spectrometric methods. 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. (1½) *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. [0-0-0; 2-3-1]
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 200; Geology 200 and one of 226 or 256. [0-0-0; 3-0-2]
321. (1½) *Paleontology I.*—Fossils as evidence 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]
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 might not graduate at the Spring Convocation. Prerequisites: Geology 235 and 302. Corequisites: Geology 304 and 305.
342. (1½) *Groundwater Hydrology.*—Introduction to theory of groundwater 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; applications in engineering and resource development. Corequisite: Geology 304. [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. [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 200 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. Offered in alternate years. [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. Offered in alternate years. [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. Given in alternate years. [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) *Ore Petrology.*—Mineralogy of ore deposits using optical microscopy and electron beam techniques. Prerequisite: Geology 302 or 303. [2-3; 0-0]

431. (1½) *Micropaleontology.*—The study of palynomorph and mineralized microfossil assemblages with emphasis on dating, correlation, environmental reconstruction and the thermal history of sediments. Prerequisite: Geology 206, 226 or 256. Given in alternate years. [2-3-0; 0-0-0]

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]

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. Offered in alternate years. [0-0; 2-2]

448. (1½/3)**c** *Directed Studies in Geology.*—Investigation of a topic to be agreed upon by a member of the faculty and the student. Permission of an undergraduate adviser and of the supervising faculty member is required before registration.

449. (3) *Thesis.*—All Honours students are required to submit a thesis involving original research on a subject approved by the Department. Restricted to students in the Honours program.

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 310, Mining and Mineral Process Engineering 303. [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]

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.

510. (1½) *High Pressure Mineralogy.*—The physical and chemical properties of minerals as they relate to their geological and geophysical behaviour. Current techniques for determining relevant properties of minerals at high pressure and temperature.

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. 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.

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 paleoecology; 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.

544. (1½) *Characterization of Porous Media.*—Nature of porous media on the microscopic and molecular scale; measurement of physical properties; interpretation of mechanical and transport properties.

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.*

551. (1½) *Permafrost Engineering.*—Geomorphic and geotechnical engineering aspects of permafrost and ground ice. Prerequisites: CIVL 311, and GEOG 306 or GEOL 351.

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. (1½) *Advanced Igneous Petrology.*—Lectures, seminars and laboratories on the application of physical chemistry to the origin of igneous rocks; crystallization processes in silicate magmas; melt physical properties, heat transfer and fluid flow.

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 1500C. Prerequisite: Geology 573 or equivalent thermodynamics, or permission of instructor.

595. (1½/3)**d** *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 (GEOP)

(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. [0-0-0; 2-2*-1]

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, corequisite: Mathematics 200. [2-3*-1; 2-3*-1]

310. (3) *Exploring the Universe.*—Modern topics of Astronomy and Geophysics without the use of advanced mathematics. Cosmology, galaxies, quasars, stellar evolution, pulsars, black holes, origin of the solar system, age of planets, space exploration, Earth's gravity and magnetic fields, seismology and earthquakes, continental drift, ice ages. This course is open only to students in third or higher years not registered in the Faculty of Science or in Engineering. 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 the 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 111 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. [2-3; 0-0]

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. [3-0; 0-0]

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.*—Quantitative 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; 3-0]

428. (1½) *Linear Inverse Theory.*—Model construction, appraisal of nonuniqueness, and inference in linear problems. Applications in all fields of geophysics. Prerequisite: Geophysics 322. [0-0-0; 3-0-1]

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 *Earthquake Seismology.*—Seismic source theory, wave propagation in layered media, anelasticity, free oscillations, instrumentation, data analysis and interpretation.

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 *Nonlinear Inverse Theory.*—Model construction, appraisal of nonuniqueness, and inference in nonlinear problems. Stochastic inverses, constrained optimization, joint inversions and image processing.

520. (1-3)c *Directed Studies in Geophysics.*

521. (1-3)c *Studies in Applied Geophysics.*

523. (1-3)c *Information Processing of Geophysical Data.*

524. (1-3)c *Studies in Glaciology.*

527. (1-3)c *Theory and Methods in Seismic Interpretation.*—Topics to be selected from the following: Forward modelling, analysis and inversion procedures as used in multichannel reflection, wide-angle reflection and refraction studies of the lithosphere. Velocity analyses, wave equation migration, dip moveout, one-dimensional synthetic seismograms, tau-p methods, waveform inversion, two-dimensional ray-tracing and synthetic seismograms, tomographic inversion.

549. (6) *M.Sc. Thesis.*

599. (6) *M.A.Sc. Thesis.*

649. *Ph.D. Thesis.*

Germanic Studies (Faculty of Arts)

German (GERM)

100. (3) *Beginners' German.*—Introduction to the language. (See also German 104 and 430.) [3-1; 3-1]

104. (6) *Beginners' German.*—Accelerated course. Grammar, composition, reading and oral work. Completion of this course is equivalent to the completion of German 110. [5-2; 5-2]

110. (3) *First-Year German.*—Review of grammar; extensive reading. Prerequisite: German 11. [4-0; 4-0]

200. (3) *Second-Year German.*—Reading, grammar, composition. This course is intended mainly for students who do not wish to take a Major or Honours degree in German. Prerequisite: German 100. [4-0; 4-0]

204. (6) *Second-Year German.*—Accelerated course. Grammar, composition, reading and oral work. Completion of this course is equivalent to the completion of German 210. Prerequisite: German 11 or 100. [5-2; 5-2]

210. (3) *Second-Year German.*—Grammar, composition, extensive reading and oral practice. Prerequisite: German 12 or 104 or 110. [4-0; 4-0]

300. (3) *Third-Year German.*—Intermediate grammar, reading, composition, conversation. This course does not carry credit towards the Major or Honours program. Prerequisite: German 200. [3-0; 3-0]

310. (3) *Third-Year German.*—Intermediate grammar, reading, composition, conversation. Prerequisite: German 210 or 204 or first class in 200. [3-0; 3-0]

320. (3) *German Literature from the Post-Romantic Period to the Present.*—Major literary trends and representative figures. [3-0; 3-0]

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]

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. (3) *Fourth-Year German.*—Advanced grammar, reading, composition, conversation. Prerequisite: German 310. [3-0; 3-0]

413. (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 translating into German and in free composition in German. Prerequisite: German 310. [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. This course is not available for credit toward a Major or Honours program in German and does not satisfy the language requirement of the Faculty of Arts. [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.*
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 (GMST)

201. (1½/3)**d** *German Literature in Translation: Great Works.*—The course concentrates on one major author each term; for example, Goethe, Kafka, Brecht, Thomas Mann. The authors' works are discussed in the context of the international literary scene. Contents will vary from year to year. [3-0] or [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. (1½/3)**d** *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 with special emphasis on novels and plays dealing with the Nazi period and World War II. [3-0] or [3-0; 3-0]
401. (1½/3)**d** *German Literature in Translation.*—Topics and themes are analysed in the light of the international literary scene; for example, the Faust figure, the opera libretto, two literatures in a divided country, the Jewish-German question, Central Europe as a cultural unit, literature and film, the German Lied. [3-0] or [3-0; 3-0]
411. (1½/3)**d** *Introduction to Scandinavian Literature.*—The major literary works of Iceland, Denmark, Norway, and Sweden in English translation. Areas of study include the Icelandic Saga, the breakthrough of modern drama (Ibsen and Strindberg), the Northern epic (Hamsun, Dinesen, and Laxness), and contemporary film (Bergman). [3-0] or [3-0; 3-0]
412. (3) *Intermediate Swedish.*—Advanced grammar, reading practice, and oral work. Prerequisite: Germanic Studies 302 or equivalent. [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 1½ units.

Greek (GREK)

(Department of Classics, Faculty of Arts)

100. (3) *Beginners' Greek.*—An introduction to the fundamentals of reading and writing classical Greek. (Credit will not be granted for both Greek 100 and Greek 125.) [4-0; 4-0]
125. (3) *Introduction to New Testament Greek.* [4-0; 4-0]
200. (3) *Second-Year Greek.*—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 corequisite: 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 corequisite: Greek 301. [3-0; 3-0]
407. (3) *Greek Philosophy and Oratory.*—Selections from Plato and/or Aristotle and oratorical works. Prerequisite or corequisite: Greek 301. [3-0; 3-0]
408. (3) *Greek History.*—Selections from Xenophon, Herodotus, and Thucydides. Prerequisite or corequisite: Greek 301. [3-0; 3-0]
410. (3) *Advanced Composition.*—Obligatory for Honours students in the third or fourth year. Prerequisite or corequisite: Greek 301. [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 (HCEP)

(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]
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. (Not offered in 1990-91.) [2-0; 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 Third 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.
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. (Not offered in 1990-91.)
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. (Not offered in 1990-91.)
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 1. Analysis of health policy making by Federal Government and the Provinces; social policies; interest group activities in policy making in Canada. Prerequisite: HCEP 500.
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 instructor.
508. (1½) *Industrial Toxicology II.*—Effects of individual toxic agents on complete organ system; problems of specific industries. Prerequisite: HCEP 507.
510. (1½) *Occupational Health I.*—Clinical diagnosis and natural history of occupational diseases; organization of occupational health services.
511. (1½) *Occupational Health II.*—Critical analysis of etiologic research in occupational health. Prerequisite HCEP 510 or permission of instructor.
512. (1½) *Occupational Hygiene: Chemical and Biological Hazards.*—Regulatory standards, sampling strategies and control methods for chemical and biological agents found in the workplace.
513. (1½) *Occupational Hygiene: Physical Hazards.*—Evaluation and control methods for physical hazards such as electromagnetic radiation, noise, vibration, cold, heat and pressure extremes.
514. (1½) *Occupational Health Policy and Standards.*— Scientific and policy issues in assessing occupational health risks, setting standards, awarding compensation. Application of research findings to development of occupational health policy.

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. Prerequisite: HCEP 501.

517. (3) *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.

519. (1½) *Health Information Systems.*— Information systems in planning and management of health care services provided through single-purpose units, comprehensive clinics and hospitals. Emphasis on computerized systems. Prerequisite: COMM 336.

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. (In 1990-91 HCEP 520 will be available for 1½ units only.)

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.

525. (1½) *Cancer Epidemiology.*—Collection and analysis of epidemiological data on cancer; occupational and other risk factors; analytic techniques and mathematical modelling relevant to oncology. Prerequisite: HCEP 400 and 502 or equivalent.

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.

527. (1½) *Analytical Methods in Epidemiological Research.*— Basic epidemiologic designs as a framework for commonly used biostatistical techniques such as the Mantel-Haenszel, chi-squared, linear and logistic regression, and survival analysis. Computer packages will be available for computation of assignments. Prerequisites: HCEP 400 and 502, or their equivalents.

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) *Control of Communicable Disease.*—Epidemiology of viral, bacterial and parasitic infections with emphasis on the control of these infections in human populations. Immunization programs will be stressed.

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. (Not offered in 1990-91.)

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 I: Evaluative Research.*—Examines the concept of evaluation in health services and how various methodological approaches can be used in evaluative studies. Prerequisites: HCEP 400 and HCEP 502.

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.

545. (2) *Seminar in Health Care Management.*—Analysis of current problems and issues in health care management. Assessment of approaches and development of sound strategies for addressing these problems and issues. Prerequisites: COMM 457, 529 and HCEP 516, 536, 540.

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 Clinical Dental Sciences
Department of Oral Biology
Department of Oral Medical and Surgical Sciences

School of Family and Nutritional Sciences:
Courses in Dietetics, 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 Pharmacokinetics

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
Psychology 430—Forensic 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 512—Theoretical Foundations of Social Work in the Health Field
Social Work 513—Theoretical Foundations of Social Welfare Development
Social Work 522—Social Policy and Program Planning in the Health Field
Social Work 523—Social Policy and Program Planning: Selected Fields
Social Work 530—Social Services Management
Social Work 570—Directed Studies in Social Work (see Social Work 430 above)

Hebrew (HEBR)

(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 the 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 (HIED)
(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.

560. (1½) *Institutional Analysis and Planning in Post-secondary Institutions.*

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*

Hindi—See Asian Studies: South Asian Languages.

Hispanic and Italian Studies—See Italian, Italian Studies, Romance Studies, Spanish and Portuguese.

History (HIST)
(Faculty of Arts)

101. (3) *Europe 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. [2-1; 2-1]

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 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 selected colonial societies from their foundations into the 19th century. [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 twelfth to the fourteenth century. [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]

215. (3) *Technology in History.*—An introduction to the history of technology and society from antiquity to the present. [2-1; 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 America, and 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]

306. (3) *History of France, 1461-1715.*—The development of absolute monarchy in France, with emphasis on: 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]

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 on 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 century, primarily in Italy, with emphasis upon the relationship of social, economic, and political factors to intellectual and cultural change. [3-0; 3-0]

314. (1½) *History of West Africa.*—Pre-colonial, colonial, and contemporary. [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]

317. (1½) *History of Southern Africa.*—Pre-colonial, colonial, and contemporary, stressing South Africa. [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 Modern Poland.*—The interplay between international and national factors in the political, social, and cultural history of the Polish people, from the Partitions in the eighteenth century to the Solidarity Movement. Attention is also given to the Jewish and Ukrainian communities. [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. (1½) *Germans and Slavs in the Early Modern Period.*—The political, social, economic, military, and cultural relations of Germans and Slavs, as well as other peoples of Eastern Europe. [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. 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 Canadian 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]

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 beginning 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. [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 and Economic History of Medieval Europe.*—A general survey of social organization, of the development of public and private institutions, and of major changes in the economy and economic organization. [2-1; 2-1]

372. (3) *Ideas and Institutions of the Middle Ages.*—Studies in medieval political ideas and the institutions of government and law. [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 Stadies 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 fourth-year students in the Major 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) *Russia Before 1917.*—Beginning with the medieval period, the course will concentrate on the era from Peter the Great to the 1917 Revolution, emphasizing domestic developments, particularly the tensions between continuity and change in this epoch of transformation, crisis, and revolutionary movements. [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. (1½) *History of the Habsburg Monarchy.*—An examination of the growth and development of the monarchy with emphasis on the eighteenth and nineteenth centuries. Some discussion of the successor states after 1918. [3-0]

413. (3) *Reformation Europe.*—An examination of European history, 1450-1650, which places both the Protestant Reformation and the Catholic Reformation in the broader context of the political, social, cultural, and economic changes during the early modern era. [2-1; 2-1]

418. (3) *Eighteenth Century Britain.*—Examines social, economic, intellectual and cultural changes in Britain in the eighteenth century with special reference to the rise of industrial society. Themes will include the origins and impact of industrialization, changing class and family relationships, the transformation of rural life, and shifts in intellectual thought. [2-1; 2-1]

419. (3) *Victorian Britain.*—An examination of the social and cultural changes in Britain from the late eighteenth to the early twentieth century. 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. Deals with the Soviet Union 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]

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]

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. [3-0; 3-0]

451. (1½) *Selected Topics in the History of Brazil.*— Examines the formation of the largest, most populous nation in Latin America, the establishment and rapid growth of its industrial economy. [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. (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 eighteenth century. (Same as Asian Studies 450.) [3-0; 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 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 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 (MEDH)

(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 (HMEC)

(School of Family and Nutritional Sciences, Faculty of Arts)

100. (1½) *Introduction to Home Economics.*—Home Economics as a distinct field integrating knowledge from the social, physical, and biological sciences; relation to other helping professions. Limited to students of the HMEC Comprehensive or Specialization programs and in the Faculty of Education Home Economics Major and Concentration programs. [3-0]

300. (1½) *Elements of Professional Practice.*—Introduction to theories of practice; overview of appropriate means of delivering professional services for a variety of groups in different settings. Limited to students in the Dietetics and Home Economics programs. [2-3]

310. (1½) *Human Growth and Development.*—The development of self, emphasizing creative personal behaviour and personal styles in human relationships. Prerequisite: FMSC 200 or Psychology 100 or 200 or 206. [3-0]

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: Chemistry 103. [3-0; 0-0]

354. (1½) *Comparative Clothing Construction.*—Investigation and application of clothing construction principles on traditional and newly developed fabrics. [2-3]

356. (1½) *Consumer and Economic Aspects of Clothing and Textiles.*—The structure of the clothing and textiles industry from fibre to the consumer. The effect of government policies, legislation, the industry's production, and marketing practices on the family as consumers. Includes the implications of the retailing of fashion goods on patterns of family consumption. Prerequisite: Economics 100. [3-0]

360. (1½) *Design Fundamentals.*—A study of the basic visual elements and the fundamental principles and concepts of design; purposes of design. [2-3]

366. (1½) *Textile Design.*—Advanced study of design elements, principles, and concepts with application to textile design. Prerequisite: HMEC 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. Offered alternate years. [0-3]

406. (1½/3)**d** *Home Economics Seminar.*—Current developments in selected areas of Home Economics. Open to third- and fourth-year students with permission of the instructor. [0-3]

430. (1½) *Designing Professional Communication Programs.*—Application of concepts of communication to designing programs for particular settings. Evaluation of such programs. Offered alternate years. [3-0]

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: HMEC 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: HMEC 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: HMEC 354, 360 and 454, or permission of instructor. [0-0; 2-3]

460. (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. Prerequisite: HMEC 360. [0-0; 2-2]

466. (1½/3)**d** *Special Problems in Home Economics.*—Current topics in a specific area of Home Economics, based on original laboratory or field research.

476. (1½) *Directed Study in Home Economics.*—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 Home Economics students only.

Home Economics Education (HMED)

(Faculty of Education)

314. (2) *Curriculum and Instruction in Home Economics: Secondary.*—Curriculum organization in home economics; principles and methods of instruction applied to teaching home economics. Prerequisite: a completed concentration in home economics or permission of the Head; corequisite Education 311. [2-4; 0-0]

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. Corequisite: 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 (HUNU)

(School of Family and Nutritional Sciences, Faculty of Arts)

***Courses which have science credit are preceded by an asterisk. Courses marked with an asterisk are also acceptable for credit in the Faculty of Arts toward the B.A. degree.**

Note: HUNU 209 may be taken for Arts credit as a List B (second year) elective and HUNU 303 and 351 may be taken for Arts credit as a 'course from another faculty or degree program'. (See front section of the Faculty of Arts entry in this Calendar.) Otherwise, HUNU courses may not be taken for Arts credit.

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 both experimental and practical in nature. Prerequisites: Chemistry 103 or 110 or 120, and Biology 101 or 102. [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 HUNU 203 and the combination of HUNU 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: HUNU 203 or 209. [0-0; 3-0]

209. (1½) *Nutrition.*—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. Prerequisite: Chemistry 11; Chemistry 12 or Chemistry 103 strongly recommended. [3-0; 0-0]

211. (1½) *Perspectives in Nutrition.*—Introduction to the study of nutrition and its application to dietetic problems in a modern society. Prerequisite: At least one course in chemistry and one course in biology. Credit will not be granted for both HUNU 211 and either HUNU 203 or 205. [3-0; 0-0]

301. (1½) *Consumer Aspects of Food.*—How food choices in the market place and patterns of consumption are influenced by economic, physiological, social, cultural, and environmental factors. Legislation governing food; food markets and merchandising techniques; criteria for food selection. Prerequisites: HUNU 201, and 205 or 211. [3-3; 0-0]

303. (1½) *World Problems in Nutrition.*—Conceptualization and scientific analyses of global problems in food and nutrition. Complexities of food habits and malnutrition in various cultures around the world will be examined. [3-0]

*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 disease. Credit can not be obtained for both HUNU 203 and the combination of HUNU 305 and 307. Credit granted for only one of HUNU 305 and ANSC 322. Prerequisite or corequisite: Biochemistry 300 or 302 and Biology 353 or equivalent. [3-0; 0-0]

*307. (1½) *Human Nutrition II.*—A continuation of HUNU 305 to include discussion of vitamins and minerals and their interrelations in metabolism. Prerequisite: HUNU 305. Credit will not be given for both HUNU 203 and the combination of HUNU 305 and 307. Credit granted for only one of HUNU 307 and ANSC 322. [0-0; 3-0]

*309. (1½) *Human Nutrition Laboratory.*—Characteristics of nutrients, including proteins, lipids, carbohydrates, vitamins, and minerals, and methods used to study their role in human nutrition. Prerequisite or corequisite: HUNU 305 and 307. Credit will not be given for both HUNU 309 and either ANSC 321 or 323. [0-3; 0-3]

321. (1½) *Food Service Systems.*—Planning, organization, and management of institutional food service including computer applications, and field trips to the community. Prerequisite: Commerce 329 or 120. Not available for credit to students in the Faculty of Science. [0-0; 3-3]

351. (1½) *Human Physical Growth and Development.*—A review of the field of Human Biology from the aspect 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 consequences in the population. Not available to students in Home Economics. Not available for credit to students in the Faculty of Science. [3-0]

401. (1½) *Advanced Foods.*—Evaluation of foods for nutrient content and characteristics of acceptability. Variations of 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. (1½/3)**d** *Selected Topics in Human Nutrition.*—A seminar on current developments in Human Nutrition. A different theme will be selected each year. B.Sc. Human Nutrition students may only receive 1½ units of credit and B.Sc. (Dietet.) students may receive a maximum of 3 units of credit. Prerequisite: HUNU 305 and 307. [0-3] or [0-3; 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: HUNU 305 and 307. [3-3; 3-3]

*409. (1½) *Developmental Nutrition.*—The influence of nutrition on growth and development of animals during prenatal and early postnatal life. The approach will be largely from the standpoint of the availability and utilization of nutrients for fetal and early postnatal metabolism, and the relationship between maternal and fetal nutrition. Prerequisites: HUNU 305 and 307. [0-0; 3-0]

411. (1½) *Human Nutrition Over the Life Span.*—Nutritional requirements and dietary patterns of healthy individuals throughout the life span. Prerequisites: HUNU 305 and 307 or consent of instructor. [3-0; 0-0]

419. (1½) *Assessment of Nutritional Status.*—The use of dietary, anthropometric, biochemical and related information for the assessment of nutritional status of individuals and populations. Laboratory assignments will demonstrate data collection and processing procedures, including computer processing of dietary and biochemical data. Prerequisites: HUNU 305 and 307. [2-3; 0-0]

421. (1½) *Quantity Food Management.*—Management responsibilities in quantity food production with emphasis on menu planning, purchasing and service. Includes planning and equipping food service. Not available for credit to students in the Faculty of Science. [3-0; 0-0]

449. (3) *Honours Thesis.*

467. (1½/3)**d** *Special Problems in Human Nutrition.*—Current topics in a specific area of Human Nutrition, based on original laboratory or field research.

477. (1½) *Directed Study in Human Nutrition.*—Investigation of a problem, requiring a written or oral report of findings. Prerequisite: satisfactory standing and permission of faculty members supervising the investigation. Fourth-year Human Nutrition or Dietetics students only.

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]

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: Permission of the 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.

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: South Asian Languages.

Indonesian—See Asian Studies: South Asian Languages.

Industrial Education (INED)
(Faculty of Education)

314. (2) *Curriculum and Instruction in Industrial Education: Secondary.*—Curriculum organization in industrial education; principles and methods of instruction applied to teaching industrial education. Prerequisite: a completed major in industrial education or permission of the Head; corequisite Education 311. [2-4; 0-0]

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. Corequisite: Education 398 or 499. [1·5-0-4; 1·5-0-4]

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.

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 (INDE)
(Faculty of Medicine)

401. *Clinical Skills I.*—Principles of patient interviewing and introduction to physical examination of the normal individual.

403. *Medical Ethics.*—Ethical issues in medical practice; physician's code of responsibility towards patients and society.

421. *Clinical Skills II.*—Physical examination of patients under supervision; elicitation of abnormal physical signs relevant to organ systems in patients.

450. *Directed Studies.*—Advanced study in an approved medically relevant basic science or clinical discipline. Third year elective.

Interdisciplinary (INDS)
(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 courses.

Italian (ITAL)

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. [4-0; 4-0]

300. (3) *Advanced Composition, Translation, and Stylistics.* [3-0; 3-0]

302. (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]

303. (3) *Italian Literature from the Origins to the Romantic Period.*—A thematic approach to Italian literary works considered in a broad cultural context. Alternates with Italian 304. [3-0; 3-0]

304. (3) *Italian Literature from the end of the Romantic Period to the 1960s.*—The development of modern Italian literature against the background of social and historical events. Alternates with Italian 303. [3-0; 3-0]

400. (3) *Advanced Studies in Italian Language and Style.*—Intensive training in translation and free composition with special emphasis on the stylistic analysis of literary texts. [3-0; 3-0]

401. (3) *Italian Literature of the Middle Ages.*—Dante, Petrarch, Boccaccio, and the minor lyric poets. [3-0; 3-0]

405. (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. [3-0] or [3-0; 3-0]

406. (1½/3)**d** *Topics in Italian Literature of the Baroque Period and the Eighteenth Century.*—The topics in any year may be selected from the following: scientific prose; seventeenth-century drama; eighteenth-century drama; the Arcadia and the Italian Enlightenment. [3-0] or [3-0; 3-0]

407. (1½/3)**d** *Topics in Italian Literature: Romanticism.*—The topics in any year may be selected from the following: the Romantic debate; neoclassic and Romantic poetry; Manzoni and the novel; literature of the Risorgimento. [3-0] or [3-0; 3-0]

408. (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 twentieth-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 twentieth century: from Gozzano to Montale. [3-0] or [3-0; 3-0]

415. (3) *History of the Italian Language.* [3-0; 3-0]

420. (1½-6)**d** *Special Topics in Italian Language and Literature.*—A maximum of three units of credit is available in any one topic.

449. (3/6)**c** *Honours Essay.*

500. (3) *Bibliographic Survey of Italian Literature.*

501. (1½/3)**d** *Dante: The Minor Works.*

502. (1½/3)**d** *Dante: The Divine Comedy.*

505. (1½/3)**d** *Studies in the Literature of the Renaissance.*

506. (1½/3)**d** *Studies in the Baroque and Eighteenth Century.*

507. (1½/3)**d** *Studies in Romanticism.*

508. (1½/3)**d** *Studies in Modern Italian Literature.*

515. (1½/3)**d** *Topics in Italian Language.*

520. (1½-6)**d** *Italian Language and Literature.*—A maximum of three units of credit is available in any one topic.

549. (3/6)**c** *Master's Thesis.*

Italian Studies (ITST)

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.*—Alternates with Italian studies 432. [3-0; 3-0]

432. (3) *Twentieth-Century Italian Culture and Literature in Translation.*—Alternates with Italian Studies 431. [3-0; 3-0]

Note: Italian Studies 330, 431 and 432 do not count toward the Major or Honours program. Italian studies 330 is, however, recommended as an elective for those programs.

Japanese—See Asian Studies.

Korean—See Asian Studies.

Landscape Architecture (LARC)
(Faculty of Agricultural Sciences)

**Additional fees are charged for these courses. See Index "Fees — Special Fees".

101. (2½) *Introduction to Design Principles I.*—Studies and exercises exploring design principles using the project method as a means of environmental problem solving. Emphasis placed on developing creative abilities and the basic skills important to the landscape architect. Restricted to B.L.A. students. Prerequisite: Landscape Architecture 199. [0-8; 0-0]

102. (2½) *Introduction to Design Principles II.*—A continuation of Landscape Architecture 101, emphasizing the investigation of the design process and sources of form in landscape architecture as derived from design principles, perceptual and spatial relationships. Restricted to B.L.A. students. Prerequisite: Landscape Architecture 101. [0-0; 0-8]

103. (5) *Introduction to Design Principles.*—Studies and exercises using the project method to explore various aspects of design in the landscape. Emphasis is placed on design process and the development of creative abilities and basic skills important to the landscape architect. Students may enrol in this first year studio course during the Summer Session as an equivalent to Landscape Architecture 101 and 102. Permission of the Director of the Program in Landscape Architecture and the Head of the Department of Plant Science is required. [0-0; 0-8]

150. (1½) *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. [0-0; 2-3]

**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 101 in September.

201. (2½) *Detailed Design.*—Corners, thick walls, small places, and place making are explored in the studio through specific design exercises for special landscapes, both urban and rural. Prerequisite: Landscape Architecture 102. [0-8; 0-0]

202. (2½) *Urban Design.*—This studio focuses on the concepts and issues related to the design of the urban landscape, from the plaza to the promenade, waterfront to back lane. Prerequisite: Landscape Architecture 201. [0-0; 0-8]

220. (1½) *Landscape Architectural History.*—History, principles and theory of landscape architecture in Europe, Asia and America from antiquity to the present day. The influence of cultural attitudes and societal change upon the natural environment, town planning and design. Open to non-landscape architecture students with permission of the instructor. [3-0; 0-0]

250. (1½) *Structures and Materials.*—The theory and principles involved in the construction of landscape elements. The use and properties of construction materials. Exercises will involve the detailing of landscape elements and the development of construction drawings. Prerequisite: Landscape Architecture 150. [0-0; 2-3]

301. (2½) *Open Space Planning.*—Studio projects focusing on the role of open space in structuring city and region as a system of places and environments. Topics include city image, urban wilderness, urban-rural interface, urban agriculture, community parks and recreation planning and design, city-country linkages. Restricted to B.L.A. students. Prerequisite: Landscape Architecture 202. [0-8; 0-0]

302. (2½) *Community Design.*—Studio projects focusing on the social aspects of landscape architecture in the urban community. Concepts covered include participation systems, manipulable space design, urban commons, environmental yards, community structure as a reflection of political systems. Restricted to B.L.A. students. Prerequisite: Landscape Architecture 301. [0-0; 0-8]

320. (1½) *Design Methods and Theories I.*—The study of design methods and theories including types of design knowledge, idea generation, visual-visual and verbal-visual transformations, design programming, and project evaluation methods. Open to non-landscape architecture students with permission of the instructor. [2-2; 0-0]

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) *Advanced Landscape Technology.*—Study of advanced theories in landscape technology. Emphasis is placed on the resolution of multiple, technical issues using case study sites and the development of comprehensive contract drawings necessary to implement planning and design solutions. Prerequisite: Landscape Architecture 250. [0-0; 2-3]

355. (1½) *Introduction to Computers in Landscape Architecture.*—Introduction to DOS and the use and application of various computer-aided Design and Geographic Information System programs for design and planning issues in landscape architecture. Open to non-landscape architecture students with permission of Program Director. [1-4; 0-0]

410. (2½) *Project Design.*—The senior design studio, using large-scale project planning exercises as a means of reviewing the various design processes, detailed design, site planning, programming, and environmental issues explored across the four years of the program. Prerequisite: Landscape Architecture 302. [0-8; 0-0]

420. (1½) *Design Methods and Theories II.*—An advanced course in the exploration of design knowledge focusing on the examination of place and the systems, attitudes and ideas that influence the design of place. Open to non-landscape architecture students with permission of the instructor. [2-2; 0-0]

430. (1½/3)**c** *Directed Studies.*—Restricted to senior year undergraduate and graduate students.

440. (1½) *Landscape Planning.*—Examines in lecture and by case study the ecological, recreational, and resource concerns related to the design-planning of the larger landscape. Restricted to students with a design-planning background and study focus, with permission of the instructor. [2-3; 0-0]

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. (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 Adviser 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 Head of the Department before its initiation, and in any event, not later than October 1.

Latin (LATN)
(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.*—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: at least second-class standing in Latin 100. [5-1; 5-1]

300. (3) *Introduction to Latin for Senior Students.*—An intensive course in the fundamentals of Latin grammar and syntax. Designed for students who need to acquire a knowledge of basic Latin in one year for background in their own discipline or who plan to proceed to Latin 305. Not for credit towards a Major or Honours degree in Classics. Students may not receive credit for both Latin 100 and Latin 300. [4-0; 4-0]

301. (3) *Latin Literature of the Classical Period.*—Readings in the major Latin authors in prose and verse. Prerequisite: Latin 120 or 200. [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 200 or 300. [4-0; 4-0]

403. (3) *Latin Poetry.*—Lyric and elegiac poetry; Ovid. Prerequisite: Latin 200 or 205. [3-0; 3-0]

404. (3) *Comedy and Satire.*—Plautus, Terence, Horace, Juvenal. Prerequisite: Latin 200 or 205. [3-0; 3-0]

405. (3) *Lucretius and Vergil.*—Selections from Lucretius and from Vergil's *Eclogues, Georgics,* and *Aeneid.* Prerequisite: Latin 200 or 205. [3-0; 3-0]

407. (3) *The Roman Historians.*—Livy, Tacitus. Prerequisite: Latin 200 or 205. [3-0; 3-0]

408. (3) *Prose of the Roman Republic.*—Cicero, Caesar, Sallust. Prerequisite: Latin 200 or 205. [3-0; 3-0]

410. (3) *Advanced Composition*.—Obligatory for Honours students in the third or fourth year. Prerequisite: Latin 200 or 205. [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 (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 I*.—General principles and distribution of powers in the Canadian constitution; civil liberties. [2-0; 3-0]
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 B.C. Law Schools Competitive 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 the second year of the program will also be exempted from both parts of the course.
301. (1½) *Canadian Constitutional Law II*.—The constitutional protection of civil liberties in Canada, with primary emphasis upon the Charter of Rights and Freedoms. [3-0]
302. (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. [3-0]
312. (2) *Commercial and Secured Transactions*.—The process by which risks associated with sales transactions and payment mechanisms are allocated in the distribution of goods, services and credit. The regulatory framework governing the behaviour of suppliers of goods, credit and services including competition, consumer protection, and trade practice legislation. The regulatory framework determining priority disputes among competing ownership claimants in sales and lending transactions. Credit will be granted for only one of 310/311 or 312.
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; or 312 Commercial and Secured 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; or 312 Commercial and 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: 302 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]

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 attention 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 465 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]

406. (1½) *Appellate Advocacy Seminar.*—A seminar on appellate practice in British Columbia. Restricted to students in the Faculty's competitive mooting programs. [3-0]

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: 302 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; prosecutorial 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]

430. (1/1½)**d** *Insolvency Law, Receivership and Bankruptcy.*—The law relating to the establishment of the legal status of bankruptcy, from the initial inability of a debtor to pay through the appointment of receivers and receiver-managers, to the distribution of the debtor's assets to various classes of creditors. The role of the various parties involved in this process. [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: 302 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]

455. (1) *Topics in Native Self-Government.*—The assumption of control by Bands through bylaw enactments, membership rules, and negotiated self-government agreements. Special attention will be given to questions of jurisdiction, drafting, and the enforcement of such instruments, and to an examination of similar frameworks and plans in use elsewhere.

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 regulation 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** *Chinese Law.*—An introduction to Chinese Law emphasizing the role of law in the revolutionary society of the People's Republic of China. Attention will be given to developing a critical understanding of the Canadian legal system through a comparison with the Chinese system. May be taught as a course or a seminar. [2-0] or [3-0]

482. (1½) *Trade and Investment in The People's Republic of China.*—The legal regime in The People's Republic of China governing trade and foreign investment. May be taught as a course or a seminar. [3-0-0; 0-0] or [0-0; 3-0-0]

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]

487. (1½) *Legal Reasoning and Artificial Intelligence.*—Nature and structure of legal reasoning using techniques and technology for creating expert systems. May be taught as a course or seminar. [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 (LIBR)

(School of Library, Archival and Information Studies, Faculty of Arts)

500. (1½) *Reference and Information Services I.*—The types of information sources, both print and electronic, which have been developed to assist in the retrieval of information. The reference interview, question analysis, and search strategies. Reference work in libraries and other information agencies.

505. (1½) *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. (1½) *Library Collections and Communities.*—Developing and managing library collections to meet the information needs of user communities. Sources and acquisition of materials. Resource sharing among libraries and consortia.

515. (1½) *The Information Professions.*—Social, cultural, and economic aspects of the dissemination of information through libraries and other agencies. The governance, personnel, services, interrelationships, and history of public, academic, school, and special libraries. Concerns of librarians and information professionals.

520. (1½) *The Technologies of Information Transfer.*—The technologies used to process, store, retrieve, and deliver information, with emphasis on electronic technologies: equipment, storage media, data structures, retrieval methods, and information-handling skills.

600. (1½) *Reference and Information Services II.*—The nature of research and communication in the arts and humanities, the social sciences, and the sciences and technologies, with particular emphasis on types of print and electronic information sources. Bibliographic instruction. Trends and issues in reference and information services.

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.

606. (1½) *Services for Young People.*—Special services to the adolescent; book selection and reference work; advisory services and planned reading activities.

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.

617. (1½-3)**d** *Topics in Specialized Literatures and Materials.*

618. (1½) *Records Management.*—The generation, control, organization, storage and retrieval of records. Records management in relation to libraries.

619. (1½) *Management of Public Services.*—Provision of public services, including circulation, reference and information services, interlibrary loan and document delivery, in various types of libraries. Emphasis on theory, practice, methods and issues relating to the management of these services.

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.

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. (1½) *Classification.*—Theory and use of the major library classification schemes for general or specialized subject collections with emphasis on the Dewey Decimal and Library of Congress classifications.

625. (1½) *Management of Technical Services.*—Organization and administration of operations involving acquisitions, cataloguing and circulation of library materials.

626. (1½) *Management of Library Automation.*—Management of automation projects in libraries, including a review of the major kinds of available systems. Emphasis on the selection, installation and maintenance of purchased hardware and software.

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. (1½) *Descriptive Cataloguing of Special Materials.*—Principles and practices of applying the Anglo-American Cataloguing Rules and the MARC format to a wide range of serial and non-book materials.

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.

649. (1½-3)**d** *Topics in the Management of Libraries and Archives.*—Lectures and readings on specialized topics relating to the management of libraries and archives.

651. (1½-3)**d** *Advanced Seminar.*—Consideration of special problems in library service; student preparation of analyses for presentation and group discussion.

652. (1-3)**c** *Directed Study.*—Individual programs of reading under faculty direction.

653. (1½-3)**c** *Individual Research Project.*—Studies, directed by a faculty member, culminating in a research paper prepared by the student. Prerequisite: Librarianship 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 (LIBE)

(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 design, development, and staffing patterns. [3-0; 0-0]

382. (1½) *Services and Programs in Elementary School Libraries.*—The roles of principals, teachers, and teacher-librarians in promoting school libraries as instructional resources. Cooperative instructional planning. Using resources to improve reading, listening, and viewing skills. 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 on principles, philosophy, and policies on which these are based and on the roles played by teacher-librarians, administrators, and teachers in the selection process. Consideration of censorship as it affects school libraries. [3-0; 0-0] or [0-0; 3-0]

384. (1½) *Selection of Materials (Advanced).*—Selection criteria applied to specific types of materials; special problems in selection; 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. Emphasis placed on encyclopedias, dictionaries, almanacs, atlases, and yearbooks. [3-0; 0-0] or [0-0; 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) *Resource-Based Teaching.*—Cooperative planning and teaching strategies whereby teachers and teacher-librarians integrate resource materials into the curriculum. [3-0; 0-0] or [0-0; or 3-0]

449. (1½/3)**c** *Supervised Study.*—Investigation of a particular problem in Library Education. Supervised by a faculty member chosen by the student. Agreement of supervisor and approval of the Head required.

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 (LING)

(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 toward a Major or Honours program in Linguistics. [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 the 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. (Also listed as Romance Studies 478 and French 478.) [3-0] or [3-0; 3-0]

330. (1½/3)**d** *Seminar in Linguistics*.—Reports and group discussions on linguistic problems. Open only to students majoring in Linguistics. [3-0] or [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. Prerequisite: 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] or [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. Prerequisites: Linguistics 310 and 315, or permission of the 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. Not available for credit toward a Major or Honours program 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] or [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. [3-0] or [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. Prerequisites: Linguistics 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. Prerequisites: Linguistics 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] or [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] or [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 be treated primarily from a linguistic point of view. [3-0] or [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: Linguistics 301 and 401, or equivalent.

509. (1½) *Phonological Theory and Analysis I*.—Prerequisites: Linguistics 400 and 401.

510. (1½) *Phonological Theory and Analysis II*.— Prerequisite: Linguistics 509.

512. (1½) *Current Models of Phonology*.—Survey of current phonological models such as autosegmental theory, metrical tree vs. grid theory, syllable structure, and alternative frameworks of segmental representation. Prerequisites: Linguistics 509 and 510, or equivalent.

515. (3) *Language Structure Seminar*.

519. (1½/3)**d** *Problems in Comparative and Historical Linguistics*.

520. (1½/3)**d** *Problems in Grammatical Analysis*.

522. (1½) *Current Models of Syntax*.—Survey of current theories such as relational grammar, generalized phrase-structure grammar, and lexical functional grammar. Prerequisites: Linguistics 501 and 520, or equivalent.

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: Linguistics 531.

533. (1½/3)**d** *Indian Languages of the Northwest*.

536. *Generals Paper in Phonology*.

537. *Generals Paper in Syntax*.

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 (MRNE)

(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 Biology 426.

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 envisaged.

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: Biology 320, 205, or their equivalents. Credit will be given for only one of Marine Science 435 and Biology 305.

440. (3) *Biology of Marine Birds.*—Study of interrelationship of birds and the marine environment. Census techniques and observation of birds in the 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, Biology 310, and Psychology 306.

450. (1½) *Principles of Aquaculture.*—An interdisciplinary introduction to the principles underlying the commercial cultivation of aquatic plants and animals emphasizing marine systems. The course will include working site visits to a range of commercial farms and R&D facilities.

454. (1½) *Special Topics in Aquaculture.*—An examination of the culture techniques for selected groups of aquatic plants, animals or micro organisms. Participants will be expected to complete a project which examines some aspect of applied science relevant to commercial culture.

460. (1½) *Special Topics in Aquacultural Applied Science.*—An examination of the principles underlying the application of selected areas of scientific information to commercial aquaculture. Participants will be expected to complete a written project.

470. (1½) *Directed Research in Aquaculture.*—Design and execution of a research project in the field of aquaculture under the supervision of a scientist working at the Bamfield Station. A written report is a requirement.

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 (MATH)

(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 the minimum passing grade 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 grant1½ 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) *Elementary Probability.*—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, 121 or 141, or at least second-class standing in Math 100, 120 or 140, or advanced credit for Math 100. [3-0; 0-0] or [0-0; 3-0]

223. (1½) *Linear Algebra I.*—Vector spaces, linear transformations, spectral theory, linear systems, applications. Intended for Honours students. Prerequisites: Second class in MATH 101 or 121. Credit will be given for only one of MATH 152, 221, 223. [3-0; 0-0]

224. (1½) *Linear Algebra II.*—Inner product spaces, QR factorization, polar decomposition, generalized inverses, singular value decomposition, quadratic forms. Prerequisites: Second class in MATH 223 or permission of the Head. Credit will be given for only one of MATH 224 or 307. [0-0; 3-0]

226. (1½) *Advanced Calculus I.*—Functions of several variables: limits, continuity, differentiability; implicit functions; Taylor's theorem; extrema; Lagrange multipliers; multiple integration, Fubini's theorem; improper integrals. Prerequisite: At least second class in Mathematics 121 or permission of the Head. Corequisite: Mathematics 221 or 223. Credit will be given for only one of Mathematics 200, 226, 253. [3-0; 0-0]

227. (1½) *Advanced Calculus II.*—Parametrization of curves and surfaces; line and surface integrals; theorems of Green, Gauss, Stokes; applications to physics and/or introduction to differential forms. Prerequisite: Second class in MATH 226 or permission of the Head. Credit will be given for only one of Mathematics 201, 227, 254. [0-0; 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 227 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 226. 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 223. A student may not obtain credit for more than one of MATH 224 or 307. [3-0; 0-0] or [0-0]

310. (3) *Geometry.*—Euclid's axioms, projective geometry, other systems, elements of combinatorial topology. Prerequisite: Mathematics 221 or 223. [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 223. [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 Math 226) and Math 221 (or 223). [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 226, 227 or in Math 200, 220, 221 (or 223). [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 227 (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 224 or MATH 307, or by permission of the Head. [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 226, 227 and Math 221 or 223. Credit will only be given for one of Math. 323 and 315/316. [3-0; 3-0]

335. (1½) *Introduction to Mathematics.*—Intensive course with required tutorial. Topics selected from combinatorics, probability, geometry and elementary number theory. Credit will not be given for both Math 335 and Math 130. Students who obtain credit for Math 100 or Math 140 cannot in the same year or in later years, obtain credit for Math 335. Grade 12 level mathematics strongly recommended. [3-0-2; 0-0-0] or [0-0-0; 3-0-2]

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 223. [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, tree growing algorithms, and proof techniques. 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 Applications.*—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) *Applied Complex Analysis.*—Complex variables, analytic functions, contour integration, Laurent series, residues, Laplace transforms, conformal mappings. Credit will be given for only one of Mathematics 350 or 357. Prerequisites: Mathematics 152, 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 224. [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; Godel'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]

427. (1½) *Mathematical Classical Mechanics I.*—Newton's equation, Conservation laws, the Euler-Lagrange equation; Hamilton's principle of least action, Hamilton's equations, Lagrangian mechanics on manifolds. PHYS 306 is recommended as a companion course. Prerequisite: PHYS 206, MATH 315 or 323. Corequisite: MATH 320. (Not offered every year.) [3-0; 0-0]

428. (1½) *Mathematical Classical Mechanics II.*—Differential forms, symplectic manifolds, canonical transformations, Hamilton-Jacobi equation, Integrable systems, Liouville-Arnold theorem, perturbations of integrable systems. Prerequisite: MATH 427. [0-0; 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. (1½) *Combinational Optimization.*

524. (1½) *Optimal Control Theory.*—Optimal control of systems governed by ordinary differential equations. The control problem will be carefully stated, and existence results and necessary conditions will be established. Hamilton-Jacobi-Bellman theory will be introduced.

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.

541. (1½) *Topics in Optimization.*

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 (MAED)
(Faculty of Education)

314. (2) *Curriculum and Instruction in Mathematics: Secondary.*—Curriculum organization in mathematics; principles and methods of instruction applied to teaching mathematics. Prerequisite: a completed concentration in mathematics or permission of the Head; co-requisite Education 311. [2-4; 0-0]

320. (1) *Curriculum and Instruction in Mathematics; Elementary.*—Curriculum organization in mathematics; principles and methods of instruction applied to teaching mathematics. Prerequisite: Education 310. [0-0; 1-2]

372. (1½) *Mathematics Teaching: Problem Solving.*—Problem solving strategies, and methods for teaching such strategies in elementary and junior secondary schools. Prerequisite: Mathematics Education 314 or 320. [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 and junior secondary schools. Prerequisite: Mathematics Education 314 or 320. [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. Corequisite: 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 320; or co-requisite: Mathematics Education 314. [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 320. [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 (MECH)
(Faculty of Applied Science)

250. (1½) *Microcomputing Techniques in Mechanical Engineering.*—Introduction to microcomputer hardware and system software. Use of high level languages and computer graphics for engineering problem solving. Instruction and laboratory exercises in the use of software packages: computer aided drafting and design, spread sheets, equation solvers, database and word processing. Introduction to computer aided manufacturing. Prerequisite: APSC 151, CPSC 151 or equivalent. [1-3-0; 0-0-0]

260. (1½) *Introduction to Mechanics of Materials.*—Statically determinate frames and trusses; shear force and bending moment diagrams; theory of beam bending, moment-curvature relation, bending stress, shear stress, deflection; torsion of circular rods; transformation of stress and strain in two dimensions, Mohr's circle. Prerequisites: MATH 152, 154 and PHYS 170. [3-0-1; 0-0-0]

265. (1½) *Rigid Body Dynamics.*—Dynamics of systems of particles. Kinematics of rigid bodies. Kinetics of rigid bodies in 2D using equations of motion, and energy and momentum principles. Introduction to kinetics of rigid bodies in 3D; inertia matrix, Euler's equations, simple gyroscopic effects. Engineering applications. Prerequisites: MATH 152, 154; PHYS 170. [0-0-0; 3-0-1]

270. (1) *Thermodynamics I.*—Energy resources; renewable and non-renewable. First law of thermodynamics for control masses and control volumes. Thermodynamic properties of working fluids; state relationships for real and ideal fluids. Combustion, heat exchange, air conditioning, energy storage, and other applications of mass and energy conservation to steady and unsteady flows. Prerequisite: PHYS 153. [0-0-0; 2-0-1]

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 turbomachine flow; forces on bodies in flow. Prerequisites: MATH 152, 154; PHYS 153, 170. [3-0-2*; 0-0-0]

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. [3-0-0; 0-0-0]

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. [0-0-0; 3-0-0]

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, 360 and MMAT 380. [0-0-0; 2-0-2]

355. (1½) *Vibration and Stress Measurement.*—Characteristics and theory of vibration and stress transducers; experimental measurement of vibration and stress; experimental procedures and design. Data acquisition methods and frequency analysis. Prerequisites: MECH 260, 265; 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. [3-0-0; 0-0-0]

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) *Thermodynamics II.*—Second law of thermodynamics for control masses and control volumes. Existence, evaluation and practical use of entropy. Determination of best possible performance of energy conversion devices. Availability, maximum useful work and chemical equilibrium. Application of second law concepts to flows in compressors, pumps, turbines, heat exchangers, combustors, and to Otto, Diesel, gas turbine, Sterling, and other engine cycles. 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: MATH 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]

392. (1) *Manufacturing Processes.*—Manufacturing properties of materials and their control. Metal forming processes, plastic deformation, rolling, forging, drawing, extrusion, sheet metal forming. Machining processes and machine tools, turning, milling, drilling, grinding. Metal fabrication, welding and casting. An introduction to process planning. Prerequisites: MECH 360, MMAT 380. [0-0-0; 2-0-0]

398. (1) *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.

410. (1-3)**d** *Special Topics in Mechanical Engineering.*—Lectures and readings on specialized topics of current interest in Mechanical Engineering.

441. (1½) *Computer-Aided Ship Design.*—Introduction to computer-aided ship design; numerical procedures applied to form, curve fairing, stability, resistance, propulsion, motion manoevering and strength. Each student will complete a preliminary design of a conventional ship or, with permission of the instructor, may undertake a preliminary design of a ship intended for special applications. Prerequisites: MECH 340, 341. [0-0-0; 2-2-0]

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]

443. (1½) *Experimental Naval Architecture.*—The course covers planning and execution of experiments related to marine vehicle resistance, propulsion, seakeeping, structural and hydroelastic systems. Vehicle hydrodynamics as well as experimental methods, data acquisition, processing and interpretation are stressed. Prerequisite: MECH 341. [1-2-1; 0-0-0]

450. (1½) *Design I.*—Properties and selection of materials; stress concentration and fatigue; screws, fasteners and joints; mechanical springs; friction and wear. Prerequisite: MECH 350. [2-0-3; 0-0-0]

451. (1½) *Design II.*—Rolling and hydrodynamic bearings; spur, helical, bevel and worm gears; gear trains; shafts; clutches, brakes and couplings; circuits; flexible machine elements. Prerequisite: MECH 450. [0-0-0; 2-0-3]

453. (1) *Friction, Wear and Lubrication.*—Tribology and its role in mechanical design; surface topography, static and dynamic contact mechanics, mechanisms of friction and wear of materials, lubrication mechanisms, liquid and solid lubricants. Prerequisites: MECH 360, 375. [2-0-0; 0-0-0]

454 (1) *Fluid Film Lubrication.*—Physical properties of lubricants, hydrostatic and hydrodynamic lubrication, dynamics of bearings and rotor systems, viscous pumps, compliant surface bearing materials; with applications to design. Prerequisites: MECH 360, 375. [0-0-0; 2-0-0]

455. (1½) *Mechanical Engineering Project I.*—Project work under the supervision of various faculty members, intended to provide experience in research, development, and/or design. For students in Computer-Aided Automation option. MECH 455 cannot be taken concurrently with MECH 456. [0-3-0; 0-0-0] or [0-0-0; 0-3-0]

456. (1½) *Mechanical Engineering Project II.*—Project work under the supervision of various faculty members, intended to provide experience in research, development, and/or design. For students in Computer-Aided Automation option. MECH 456 cannot be taken concurrently with MECH 455. [0-3-0; 0-0-0] or [0-0-0; 0-3-0]

457. (3) *Mechanical Engineering Project.*—Project work under the supervision of various faculty members, intended to provide experience in research, development and/or design. Prerequisite: Third-year Mechanical Engineering. [0-3-0; 0-3-0]

460. (1½) *Mechanics of Materials II.*—Stress concentration factors; fatigue, fracture and stress intensity factors; axisymmetric bending of circular plates and cylindrical shells; torsion of thin walled members of open and closed cross-section; shear flow, shear centre and bending of beams with asymmetric cross-section; bending of beams beyond the elastic limit, residual stresses, plastic collapse and limit analysis; Euler buckling and beam-columns. Prerequisite: MECH 360. [0-0-0; 3-0-0]

461. (1) *Experimental Mechanics.*—Measurement of stress, structural vibrations, and noise. Experimental techniques, data analysis, and interpretation of results. Prerequisites: MECH 355, 390. [1-0-2]

462. (1½) *Finite Element Analysis.*—Theory and element selection. Development of computer programs for simple problems. Utilization of existing computer packages. Application to mechanical engineering problems. Prerequisites: MATH 257, MECH 360. [2-2*-0; 0-0-0] or [0-0-0; 2-2*-0]

465. (1½) *Mechanical Vibrations.*—Review of single degree of freedom systems. Lagrangian formulation procedure. Response of multi degree of freedom systems and continuous systems. Approximate numerical methods. Prerequisite: MECH 365. [0-0-0; 3-0-0]

466. (2) *Automatic Control.*—Process and system characteristics; transient response; the closed loop; block diagrams and transfer functions; control actions; stability; Nyquist diagrams; Bode diagrams; root locus methods; frequency response; system compensation; nonlinear control systems; digital computer control. Laboratory experiments to support the lecture content. Prerequisites: MECH 365, ELEC 263. [3-2*-0; 0-0-0]

467. (1½) *Advanced Dynamics.*—Advanced topics in vibration analysis, self-excited oscillations, satellite librations, theory of stability, analysis of non-linear systems. Prerequisite: MECH 465. [3-0-0]

468. (1½) *Modern Control Engineering.*—Introduction to state space control methods for linear systems including modal control, controllability, observability, linear quadratic regulators, optimal control. Prerequisite: MECH 466. [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. Prerequisite: MECH 370. [2-0-1; 0-0-0]

473. (1) *Heating, Ventilating and Air Conditioning.*—Principles of air conditioning; psychrometrics and refrigeration. Heat transfer through building materials. Estimation of heating and cooling loads. System design. [2-0-1; 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. Prerequisite: completion of any second year program in Applied Science or Science. [2-0-1]

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. [2-0-1; 0-0-0]

480. (1½) *Computational Fluid Dynamics.*—Current computational methods, surface singularity methods in potential flow; method of characteristics in supersonic flow; boundary layer methods. Prerequisites: 70% average in previous MATH and CPSC courses and in MECH 280, 380. [3-0-0]

481. (1½) *Aerodynamics of Aircraft I.*—Low speed aerodynamics of airfoils, wings, wind tunnels. Prerequisites: 2nd class average in 3rd year mechanical engineering program. [3-1*-0; 0-0-0]

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. Prerequisite: MECH 380. [3-1*-0]

483. (1½) *Aerodynamics of Aircraft II.*—High speed aerodynamics of airfoils and wings; performance, stability. Prerequisite: MECH 481. [0-0-0; 3-1*-0]

484. (1½) *Aircraft Stability and Control.*—Review of longitudinal static stability criteria and extension to cross coupling of pitch, yaw and roll stability. Introduction to dynamic control including start period and phygoid oscillations. Preliminary design of control surfaces.

485. (1½) *Aircraft Design and Manufacture.*—Conceptual design of an aircraft to meet specific mission requirements. Wing, fuselage and empennage design for performance, strength and stability according to current aircraft regulations. Specific problems related to aircraft manufacturing.

486. (1½) *Fluid Flow in Industrial Equipment.*—Review of pumps, turbines and hydraulic motors. Analysis of piping networks. Pneumatic and hydraulic circuits and components. Flow measurement devices such as flow meters and transducers for measuring velocity and pressure.

490. (1½) *Production Engineering.*—Product design for manufacturing. Manufacturing processes. Production systems. Materials handling systems. Process planning. Production scheduling. Prerequisite: MECH 290. [3-0-0]

491. (2) *Computer-Aided Manufacturing.*—NC programming and machining with APT and interactive graphic systems. Digital logic design, interfacing and assembly programming for manufacturing automation. Design principles of CNC machines, digital control of feed drive servos, real time linear and circular interpolator design techniques. Introduction to unmanned manufacturing. Supplementary tutorial laboratory experiments. Prerequisites: MECH 290 or 392, MECH 466. [0-0-0; 3-2*-0]

495. (1½) *Industrial Engineering.*—Man-machine systems. Work measurement. Plant location and layout. Quality control and maintenance. Value analysis. Information processing. Prerequisite: MECH 391. [3-0-0]

496. (1½) *Engineering Management.*—Organization structures. Management styles. Cost systems and control. Financial statements; accounting procedures. Budgets and performance control. Project management. Human resources management. Prerequisite: MECH 391. [3-0-0]

501. (1½) *Thermodynamics.*—Thermodynamic principles, Maxwell relations, availability, irreversibility and equilibrium. Introduction to statistical mechanics.

502. (1½) *Fluid Mechanics.*—Governing equations; viscous incompressible flow, incompressible potential flow; incompressible boundary layers, stability and turbulence; compressible potential flow.

510. (1½) *Computational Methods in Transport Phenomena I.*—Finite difference and control volume methods used in the solution of transient and steady state diffusion equations. Heat conduction associated with phase change. Computation of laminar flows. Coupling between momentum, heat, and mass transfer. The Marker and Cell methods and program presentation.

511. (1½) *Computational Methods in Transport Phenomena II.*—Transport equations in turbulent flows associated with heat and mass transfer. Discretization schemes. Treatment at boundaries. Flow chart and program presentation. Examples of application. Prerequisite: MECH 510 or equivalent.

520. (1½) *Control Sensors and Actuators.*—Review of control, instrumentation and design. Performance specification of control components, component matching, error analysis. Operating principles, analysis, modelling, design considerations of control sensors and actuators such as analog sensors for motion measurement, digital transducers, stepper motors, DC motors, induction motors, synchronous motors, and hydraulic actuators. Control techniques pertaining to actuators. Applications.

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 Vehicles.*—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. (1½) *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. Prerequisite: MECH 390 or STAT 251.

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, optinization 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 radation 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. (1) *Combustion.*—Thermodynamics of combustion, stoichiometry, heat of formation and reaction. Equilibrium composition and adiabatic flame temperature. Chemical kinetics of combustion. Flames in premixed gases; laminar and turbulent flame propagation. Diffusion flames, pollutant emissions and combustion in IC engines.

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 hydro-dynamic 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.

590. (1½) *Manufacturing Automation.*—Review of mechanics of metal cutting. Machine tool structures, static deformations, forced and self-excited vibrations and chatter. Design principles of CNC machines; state space and transfer function models of feed drivers, d.c. servo motors and amplifiers. Contouring analysis in multi-axes machining. Unmanned manufacturing topics: Sensors, adaptive control and monitoring in metal-removing processes.

595. (1) *Systems Modelling and Simulation.*—Modelling of discrete and continuous systems on digital computers. Application of discrete simulation languages to the analysis and design of service and manufacturing systems. Statistical concepts in analysis and validation. Application of continuous simulation languages to the analysis and design of dynamic and control systems. Integration methods and algorithms, optimization and iterative problems.

596. (3) *Project in Automation.*—Supervised laboratory project in control and automation, for students registered in the M.Eng. program in Automation. A comprehensive report is required which also satisfies the report requirement for the M.Eng. degree. Offered in the Spring Session.

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. degeee.

Medical Genetics (MEDG)

(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. [3-0; 0-0]

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) *Biology and Genetics of Neoplasia.*—A lecture course reviewing a wide range of topics related to cancer; biology and immunology of tumor cells, chemical and viral carcinogenesis, oncogenes and genetic predisposition, mechanisms of abnormal growth regulation, principles of cancer treatment. 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) *Biology and Genetics of Neoplasia.*—Same as MEDG 421, with additional seminars for graduate students on current research topics. Same as PATH 531. Credit will only be given for one of MEDG 421, MEDG 521 or PATH 531. Prerequisite: Biology 334 and permission of instructor. [0-0; 3-0]

530. (3) *Advanced Human Genetics.*

548. (1-3)c *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 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 (MEDI)

(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.

453. (1½) *Introduction to Electrocardiography.*—Patterns of electrical activity of the heart in electrocardiograms of normal subjects using the vector approach, and their aberration by pathological states. Elective for third-year medical students.

475. *Medicine-Clinical Clerkship.*—This consists of a period of twelve 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.

501. (1½) *Pathophysiology of Experimental Medicine.*—Abnormal physiological mechanisms in diseases of the heart, lungs, kidney, gastrointestinal tract and central nervous system.

502. (1½) *Experimental Medicine Methodology.*—Laboratory experience with experimental models of human disease; critical reviews of their relevance.

510. (1½) *Nephrology.*—Mechanisms of regulation of acid-base balance, fluid and electrolyte content, excretion of proteins and organic substances in kidney disease; abnormal renal mechanisms in hypertension.

530. (1½) *Gastroenterology.*—Pathogenesis and abnormal physiology in disease of the intestine and accessory organs; carcinogenesis; regulatory peptides; liver disease; inflammatory bowel disease; oesophageal dysfunction.

535. (1½) *Research Seminar.*—Reviews of research in selected areas of experimental medicine, including presentation of student's own research results.

540. (1½) *Advances in Neurology.*—Pathogenesis and immunological mechanisms in acute and chronic virus infections of the central nervous system; immunologically induced non-infectious neurological disease.

548. (1-3)**d** *Directed Studies in Experimental Medicine.*

549. (6) *M.Sc. Thesis.*

560. (1½) *Pulmonary Pathophysiology.*—(Same as Pathology 518.)

570. (1½) *Cardiology.*—Pathogenesis, abnormal physiology and therapeutic approaches in heart disease including cardiac arrhythmia, heart failure, myocardial infarction, hypertension, atherosclerosis.

580. (1½-3)**c** *Experimental Medicine: Infectious Diseases.*—Supervised individual program of directed studies in experimental aspects of pathogenesis, diagnosis and treatment of infectious diseases, and mechanisms of host defence against microbial infections. Prerequisite: PATH 427 or equivalent.

590. (1½) *Molecular Regulation of Cell Growth and Differentiation.*—Cytokines and signal transduction mechanisms in the growth and differentiation of germ line, haemopoietic and other eukaryotic cells; actions of oncogene and tumour-suppressor gene products; molecular concepts derived from experimental model systems; molecular strategies of cytokine therapy. Prerequisites: MICB 302, BIOC 402, 403 or permission of course coordinator.

649. *Ph.D Thesis.*

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 (MDVL)

(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 the 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.*

Metals and Materials Engineering (MMAT)

(Faculty of Applied Science)

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. (1½) *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. Prerequisite: MMAT 262. [0-0-0; 3-3*-0]

280. (1) *Engineering Materials II.*—Atomic mobility, solidification, electrical conduction, semiconductors, magnetic materials, composite materials, selection of materials. Prerequisite: APSC 278. [0-0-0; 2-0-0]

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. Prerequisite: MMAT 264. [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. (2½) *Process Metallurgy.*—Application of chemical principles to unit processes employed in metallurgical operations; technology of base metal production. Prerequisite: MMAT 264. [2-3-2*; 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. Prerequisite: CHML 251 or MECH 280. [2-0-0; 0-0-0]

361. (1½) *Application of Numerical Methods to Materials Engineering.*—Selected examples in materials engineering will be employed to demonstrate the use of numerical integration and differentiation; the use of numerical methods to solve non-linear, ordinary and partial differential equations which stem from standard practical problems. A two hour problem session will provide the students with hands-on experience at programming algorithms. [0-0-0; 2-0-2*]

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. Prerequisite: CHML 251 or MECH 280. [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]

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. (1½) *Structure and Properties of Materials.*—Strengthening mechanisms; heat treatment and properties of steel and other alloys; metal failures. (A service course for Mechanical Engineering.) Prerequisite: APSC 278. [3-0-0; 0-0-0] or [0-0-0; 3-0-0]

382. (1½) *Ceramics 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]

391. (1) *Polymers I.*—The chemical structure of polymers; thermal properties; mechanical properties; processing of polymers; fabrication processes; design considerations. [2-0-0; 0-0-0]

398. (½) *Engineering Report.*—All students entering third year Metals and Materials Engineering are required to write two reports, one based on a field trip. 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 Metals and Materials Engineering.

450. (2) *Metallurgical Thermodynamics II.*—The application of thermodynamics to metallurgical processes: thermochemistry of gas mixtures, solution thermochemistry, inter-action parameters, chemical potential and free energy diagrams applied to metallurgical processes and thermodynamic modelling. Prerequisite: MMAT 350. [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. Prerequisite: MMAT 350. [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. Prerequisite: MMAT 350. [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. Prerequisites: MMAT 352 and 456. [0-0-0; 2-0-0]

462. (1) *Process Modelling.*—Mathematical modelling of metallurgical processes using principles of heat, mass and momentum transfer; numerical methods applied to process modelling; melting and solidification processes; controlled heating and cooling operations. Prerequisites: MMAT 360 and 362. [2-0-0; 0-0-0]

466. (1½) *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. Prerequisite: MMAT 352. [0-0-0; 2-0-3*]

468. (1) *Thermodynamics Problems.*—Application of thermodynamics to metallurgical processes: slag chemistry, Rist diagrams, distribution coefficients in matte converting, regular solutions, Gibbs-Duhem equation and complex equilibria. Prerequisite: MMAT 450. [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. Prerequisite: MMAT 376. [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. Prerequisite: MMAT 376. [2-3*-0; 0-0-0]

474. (1) *Mechanical Working.*—Effect of temperature, strain rate, state of stress and structure on the deformation behaviour of metals and alloys at large strains. Criteria for workability of metals. Applications to the analysis of such hot and cold working processes as forging, rolling, extrusion, deep drawing, wire and tube drawing. Friction and lubrication in metal working. Credit will not be given for both MMAT 252 and MMAT 474. [0-0-0; 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) *Electronic Materials.*—Materials aspects of the production of semiconductor and optical devices will be considered including bulk semiconductor crystal growth, epitaxial growth, crystal imperfections, impurity effects, ion implanting and fabrication. Characterization of the material by analytical, electron optic and optical devices. The relationship of material characteristics and electrical properties. [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. [0-0-0; 2-0-0]

482. (1½) *Ceramics II.*—Crystalline non-metallic solids, silicates, amorphous phases, phase changes, microstructure and properties such as thermal conductivity, thermal stress, electrical conductivity. [3-0-0; 0-0-0]

483. (1) *Processing of Ceramics and Composites.*—The techniques of processing ceramics and composites into finished products. Topics include raw materials, fabrication, testing and evaluation. [0-0-0; 2-0-0*]

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: MMAT 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.*—Training and practice in public speaking and presentation of technical papers. [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. [0-0-0; 2-0-0]

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. (½) *Engineering Report.*—All students in fourth year Metals and Materials Engineering are required to write two reports, one based on a field trip. 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 Metals and Materials Engineering.

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. Prerequisite: MMAT 450.

552. (1) *Advanced Solidification Processing.*—Structure and quality in casting processes. Continuous casting of steel; direct chill casting of non-ferrous metals; near-net-shape casting; single crystal growth. Heat flow; fluid flow; development of cast structure; stress analysis.

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.

557. (1/2)**c** *Separation Science in Aqueous Metal Processing.*—The theory of solvent extraction and ion exchange, membrane separations, chemical precipitation, electrochemical separations and other techniques for aqueous metal processing will be discussed. Numerous applications from the metal processing literature will also be examined. Two units of credit will be given when the student undertakes an extra project.

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 MMPE 574. Prerequisite: MMAT 456.

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. Prerequisites: MMAT 360 and 362.

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.

573. (1) *Topics in Metals and Materials Processing.*—Current research topics in the field of metals and materials processing.

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. Prerequisite: MMAT 378.

577. (1) *Failure Analysis.*—Procedures used in the analysis of system and component failures in service. Identification of failure type and sequence. Corrective design procedures. Case studies of failures with major emphasis placed on problems associated with the pulp/paper and oil/gas industries. Prerequisite: MMAT 470.

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.

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. [0-0-0; 2-0-0]

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: MMAT 494. [0-0-0; 2-0-0]

598. *Seminar.*—Presentation and discussion of current topics in metals and materials research. A required course for graduate students in metals and materials 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 (MICB)

(Faculty of Science)

Note: Biology 101, 102 or 103 **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), (103). 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]

318. (1½) *Biotechnology I. Fermentation-Process Engineering.*—The technology of large-scale cultivation of micro-organisms, the isolation and purification of products and their industrial application. Special emphasis will be placed upon recent applications of recombinant DNA and cell fusion in biotechnology and the use of novel host organisms such as mammalian cells. Prerequisite: MICB 200 or 417. [0-0; 3-0]

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) *The Molecular Basis of Bacterial Growth Regulation.*—The response of a bacterial cell to a changing environment. The role of the cell envelope in energetics, transport and peptidoglycan synthesis. Regulation of gene expression. Biochemistry and physiology of DNA replication. Post-translational regulation of bacterial physiology. Prerequisites: MICB 200, BIOL 201. Corequisite: BIOC 302 (the requirements for BIOL 201 and BIOC 302 can be replaced by BIOC 300 with the permission of the Head of the Department). [3-0-1; 0-0-0]

325. (1½) *Genetics II.*—Second of an integrated pair of courses emphasizing fundamentals of eukaryotic gene regulation and genome organization, organelle genetics, transposons, mechanisms of mutation, recombination and DNA repair, as well as the fundamentals of developmental genetics. Same as BIOL 335. Prerequisite: BIOL 334. [0-0-0; 3-0-2]

400. (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: MICB 200 or 417, and BIOL 201. (This course is the same as BIOL 400 and SOIL 311.) [0-0; 2-4]

402. (1½) *Advanced Immunology.*—Current advances in immunology with emphasis on T and B cell development, generation of receptor diversity, immunogenetics, lymphocyte activation, and the major histocompatibility complex. Prerequisite: Microbiology 302. [3-0-1; 0-0-0]

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) *Molecular Virology.*—An introduction to virus structure and replication. Detailed examination of selected viruses including polio, HIV and cancer-causing retroviruses. Development of vaccines and anti-viral drugs, the use of virus vectors to cure genetic diseases. [3-0; 0-0]

409. (1½) *Microbial Genetics and its Applications.*—Genetic maps; transposons in genetic analysis; gene fusions; cloning vectors; physiology of heterologous gene expression; manipulation of metabolic pathways. Prerequisites: MICB 325 (or BIOL 335) and BIOC 302 (or BIOC 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. (1½) *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. [3-0; 0-0]

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) *Biotechnology II. Physiology and Genetic Manipulation of Industrial Micro-organisms.*—The physiological, genetic, developmental and morphological features of micro-organisms and animal cells which make them useful in industrial processes. Pre- or corequisite: BIOL 335. [0-0; 3-0]

419. (1½) *Techniques in Microbial Technology.*—Modern fermentation technology and downstream processing of fermentation products. Prerequisite: MICB 318 and permission of the Head. [1-4; 0-0] or [0-0; 1-4]

421. (3) *Advanced Microbial Techniques.*—A laboratory in virology, immunology, microbial physiology, microbial identification and microbial genetics. Prerequisite: MICB 321. Restricted to Major and Honours students in Microbiology. To be taken with permission of the Head. [0-4-2; 0-4-2]

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.

507. (1½) *Topics in Molecular Pathogenesis and Immunology.*—Molecular biology of disease causing agents, including bacteria and viruses, and cancers.

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 (MMPE)

(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.*—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. Prerequisite: MMPE 201. [3-3*-0; 0-0-0]

301. (2) *Mine Services.*—Introduction to mine services — mine ventilation, drainage, air and water reticulation. Power supply. Noise and lighting. Safety, fire prevention and rescue. Mine maintenance. Prerequisite: MMPE 201. [0-0-0; 3-2-0]

303. (1½) *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, geological and civil engineering 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. Prerequisite: MMPE 231. [3-3-0; 0-0-0]

332. (1½) *Unit Operations II.*—Solid/Liquid separations, clarification, thickening, filtering, drying. Testwork for flowsheet design. Flowsheet studies. Marketing ores and concentrates. Prerequisite: MMPE 231. [0-0-0; 2-3*-0]

333. (1½) *Flotation.*—Theory and technology of flotation processes. Prerequisite: MMPE 231. [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]

393. (½) *Seminar.*—Oral presentation of topics by students. Prerequisite: Third year standing in MMPE. [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. Prerequisite: Third year standing in MMPE.

395. (1) *Computer Applications in Mining and Mineral Process Engineering.*—Applications of computers in the mining industry. Course introduces students to the MTS (Michigan Terminal System) & Micro Computer Systems (PC). Programming in Basic & Fortran 77 is required. Students will run as well as design mine software. Prerequisite: CPSC 151 or equivalent. [2-0-1; 0-0-0]

396. (1½) *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. Prerequisite: MMPE 201. [0-0-0; 3-0-0]

401. (1½) *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. Prerequisite: MMPE 396. [2-3-0; 0-0-0]

402. (1½) *Mine Ventilation.*—Analysis and design of ventilation and air conditioning systems for mines and mills. Prerequisite: MMPE 201. [2-2*-0; 0-0-0]

403. (1) *Underground Rock Mechanics.*—The principles of rock behaviour as influenced by subsurface mining and excavation; stability of underground excavation; ground support systems and design; blasting, rock bursts, monitoring to assess rock behaviour. Prerequisite: MMPE 303 for Mining Engineers. [2-0-0; 0-0-0]

404. (1) *Surface Rock Mechanics.*—The principles of rock behaviour as influenced by surface mining and excavation; influence of structural geology, groundwater, and blasting on stability; stability analysis; stabilization; monitoring to assess rock behaviour. Prerequisite: MMPE 303 for Mining Engineers. [0-0-0; 2-0-0]

431. (1½) *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. Prerequisite: Fourth year standing in MMPE. [0-0-0; 2-0-3]

432. (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. Prerequisite: Fourth year standing in MMPE. [0-0-0; 2-2*-0]

433. (1½) *Surface Properties.*—Basic characteristics of interfaces. Electrical effects at solid/liquid interfaces. Surfactants, adsorption and its effect on wettability. Utilization of surface properties in mineral engineering: flotation, selective flocculation and selective coagulation, oil agglomeration. Prerequisite: Chemistry 262. [2-3-0; 0-0-0]

434. (1) *Processing of Precious Metal Ores.*—Process alternatives and mineralogical considerations; physical and chemical recovery technologies; environmental protection; flowsheet studies. Prerequisites: MMPE 331 and 332 or equivalent. [2-0-0; 0-0-0]

450. (1) *Design Project Synthesis.*—Introduction of a feasibility project and the synthesis of a common mine/plant design problem. Prerequisite: Fourth year standing in MMPE. [1-0-2; 0-0-0]

461. (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. Prerequisite: MMPE 201. [0-0-0; 2-0-0]

462. (1½) *Coal Preparation Technology.*—Review of coal classification systems. Metallurgical and thermal coals. Fundamentals of washability data. Coal preparation unit operations. Beneficiation of coal fines. Surface properties of coals and their flotation. Performance characteristics of coal-washing equipment. Separation products dewatering and water circuits. Plant layouts and typical flowsheets. Prerequisite: MMPE 231. [2-3-0; 0-0-0]

492. (½) *Field Trip.*—Held during the first week of September. Mark based on the results of field reporting after the field trip scheduled for fourth year students. The Department provides for the cost of transportation while the student must cover the cost of room and board. Prerequisite: Fourth year standing in MMPE.

493. (½) *Seminar.*—Oral presentation of a technical nature. Use of closed circuit television for personal evaluation. Prerequisite: Fourth year standing in MMPE. [0-0-1; 0-0-1]

494. (3) *Thesis/Report.*—Completion of thesis or engineering report based on work performed. Prerequisite: Fourth year standing in MMPE. [0-3-0; 0-6-0]

495. (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]

496. (1) *Systems Analysis II.*—Techniques of operations research applied to mining operations. Optimal pit and mine design studies. [0-0-0; 2-0-1]

498. (1½) *Materials Handling.*—Basic theory and practice of bulk solids and slurry handling. Case studies. Design with equipment selection. Prerequisite: MMPE 231. [2-3*-0; 0-0-0]

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, queueing 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, 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.

561. (1) *Mine Shafts and Hoisting.*—Shaft layout, guide and bunton selection. Hoist rope properties and characteristics. Drum, reel and friction hoisting. Loading and dump arrangements. Headframe layout. Incline hoisting. Signalling and safety devices. Shaft inspection and maintenance. Sinking hoists and stages.

562. (1) *Equipment Selection.*—Methods of selecting equipment for underground and surface mining. Case studies and applications.

564. (1-2)**d** *Mineral Economics.*—Mineral markets, mining finance, governmental regulations, taxation, feasibility studies. Prerequisite: MMPE 396.

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. (1/2)**d** *Processing of Mineral Fines.*—Particulate systems. Role of particle size and interfacial phenomena in properties of disperse systems. Stability of colloids and suspensions. DLVO (Dejaguin-Landau-Vervey-Overbeek) theory. Beneficiation of mineral fines. Two units credit instead of one will be given when the student satisfactorily completes an approved extra project. Prerequisites: Chemistry 262 or CHML 357 or MMPE 433.

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. Prerequisite: Permission of instructor.

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 MMAT 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. Prerequisite: MMPE 575.

577. (1) *Processing of Precious Metal Ores.*—Advances in science and technology for recovering gold, silver and platinum group elements.

590. (1-3)**c** *Special Advanced Topics.*—A special advanced course may be arranged upon the approval of the Head of the Department. Prerequisite: Permission of instructor.

592. (1/2)**c** *Stability and Rheology of Mineral Suspensions.*—Fine particle systems in mineral processing. DLVO (Dejaguin-Landau-Vervey-Overbeek) theory. Heavy media rheology. Effect of pulp rheology on wet grinding. Coal/water slurries. Fine coal agglomeration during pipelining. Two units credit instead of one will be given when the student satisfactorily completes an approved extra project. Prerequisites: Chemistry 262, or CHML 357, or MMPE 471.

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 (MLED)

(Faculty Of Education)

311. (1) *Curriculum and Instruction in Chinese: Secondary.*—Curriculum organization in Chinese; principles and methods of instruction applied to teaching Chinese. Prerequisite: a completed concentration in Chinese or permission of the Head; co-requisite Education 311. [1-2; 0-0]

312. (2) *Curriculum and Instruction in French: Secondary.*—Curriculum organization in French; principles and methods of instruction applied to teaching French. Prerequisite: a completed concentration in French or permission of the Head; co-requisite Education 311. [2-4; 0-0]

313. (1) *Curriculum and Instruction in German: Secondary.*—Curriculum organization in German; principles and methods of instruction applied to teaching German. Prerequisite: a completed concentration in German or permission of the Head; co-requisite Education 311. [1-2; 0-0]

314. (1) *Curriculum and Instruction in Italian: Secondary.*—Curriculum organization in Italian; principles and methods of instruction applied to teaching Italian. Prerequisite: a completed concentration in Italian or permission of the Head; co-requisite Education 311. [1-2; 0-0]

315. (1) *Curriculum and Instruction in Japanese: Secondary.*—Curriculum organization in Japanese; principles and methods of instruction applied to teaching Japanese. Prerequisite: a completed concentration in Japanese or permission of the Head; co-requisite Education 311. [1-2; 0-0]

316. (1) *Curriculum and Instruction in Russian: Secondary.*—Curriculum organization in Russian; principles and methods of instruction applied to teaching Russian. Prerequisite: a completed concentration in Russian or permission of the Head; co-requisite Education 311. [1-2; 0-0]

317. (1) *Curriculum and Instruction in Spanish: Secondary.*—Curriculum organization in Spanish; principles and methods of instruction applied to teaching Spanish. Prerequisite: a completed concentration in Spanish or permission of the Head; co-requisite Education 311. [1-2; 0-0]

318. (1) *Curriculum and Instruction in Modern Languages: Secondary.*—Curriculum organization in Modern Languages; principles and methods of instruction applied to teaching Modern Languages. Prerequisite: a completed concentration in Chinese, German, Italian, Japanese, Russian, or Spanish or permission of the Head; co-requisite Education 311. [1-2; 0-0]

340. (1½) *Using Canadian Children's Literature in the Classroom.*—Canadian children's literature, both French and English (in translation), appropriate for use in schools; methods of using the cultural elements of such literature. 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 or 220, and satisfactory performance in oral and written French proficiency tests. [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. Corequisite: Education 499. [0-0; 3-0]

449. (1½/3)**c** *Supervised Studies.*—Investigation of a particular problem in Modern Languages Education. Supervised by a faculty member chosen by the student. Agreement of supervisor and approval of the head required.

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 (MUSC)

(School of Music, Faculty of Arts)

100. (1) *Theory of Music I.*—Review of basic concepts and of rudiments of notation. The study of elementary diatonic harmony through work in bass realization and melody harmonization. Analysis of phrase structures and small forms. Drills in score reading. Restricted to B.Mus. and B.A. in Music students. [3-0; 0-0]

101. (1) *Theory of Music II.*—Continued study of diatonic harmony, to include treatment of all diatonic triads and sevenths, principles of voice-leading, and techniques of contrapuntal expansion. Analysis of short movements in binary and ternary form. Drills in score reading. Prerequisite: Music 100. [0-0; 3-0]

Group Instruction in Music Performance.—(Restricted to B.Mus. students.)

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) *Introduction to the Theory of Music.*—Concepts of rhythm, pitch, timbre, and texture. Notation and aural recognition of rhythmic and pitch patterns. Basic principles of melody and form. This course is not applicable to the B.Mus. degree. [3-0; 0-0]

104. (1½) *Introduction to Diatonic Harmony.*—Triads, keys, and elementary harmony in Western music. Musicianship (sightsinging, dictation, and keyboard). Elements of form and orchestration. Students choose between a two-hour laboratory in musicianship and a one-hour laboratory in composition in historical styles. Students aiming at elementary teaching certification should take the musicianship laboratory. This course is not applicable to the B.Mus. degree. Prerequisite: Music 103 or permission of the instructor. [0-0; 3-1] or [3-2]

105. (1) *Aural Skills I.*—Development of aural perception in reinforcement of Music 100 and 101, which are taken concurrently with this course. Out-of-context recognition of intervals and chords. Melodic, two-part, and harmonic dictation. Sight singing. Aural analysis of form and structure. Restricted to B.Mus. and B.A. in Music students. [0-2; 0-2]

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 is required. Not for credit toward the B.Mus. or B.A. degree in Music. [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. [2-0] or [2-0; 2-0]

120. (1½) *Music in Society.*—An introductory survey of music and musical values in Western and selected non-Western societies through humanistic, cultural, historical, and musical-analytical perspectives. [3-0; 0-0]

121. (1½) *History of Music I.*—The development of European music from Greek antiquity to circa 1600. [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 students outside the B.Mus. program by 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] or [3-0; 3-0]

149. (1) *Keyboard Harmony and Transposition.*—Designed for the keyboard performance major and keyboard concentrator in General Studies. [0-1; 0-1]

Ensembles.—(These courses may be repeated for credit in accordance with program requirements for the B.Mus. or the B.A. in Music. Open to other students by audition, with credit as stipulated by their Faculties.)

150. (1) *University Symphony Orchestra.* [0-4; 0-4]

151. (1) *University Chamber Orchestra.* [0-4; 0-4]

152. (1) *University Wind Ensembles.* [0-4; 0-4]

153. (1) *University Singers.* [0-4; 0-4]

154. (1) *University Choral Union.* [0-4; 0-4]

155. (1) *University Chamber Singers.* [0-4; 0-4]

156. (1) *Instrumental Collegium Musicum Ensemble.* [0-4; 0-4]

157. (1) *Vocal Collegium Musicum Ensemble.* [0-4; 0-4]

159. (1) *University Chamber Strings.* [0-2; 0-2]

160. (1) *String Chamber Ensembles.* [0-4; 0-4]

161. (1) *Piano Chamber Ensembles.* [0-4; 0-4]

162. (1) *Wind and Percussion Chamber Ensembles.* [0-4; 0-4]

163. (1) *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) *Stage Band.*— Performance techniques and repertoire of the jazz ensemble. [0-4; 0-4]

165. (1) *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. [0-2; 0-2]

170. (1) *Lyric Diction.*—A study of the basic phonetics and accepted principles of lyric diction of the four languages most commonly used in concert and operatic repertoire: French, German, Italian, and English. [2-0; 2-0]

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]

173. 273. 373. 473. (3) *Music Performance (Secondary).*—Private instruction, vocal or instrumental. [0-1½; 0-1½]

182. 282. 382. 482. (2) *Music Performance (Concentration).*—Private instruction, vocal or instrumental. [0-1; 0-1]

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]

192. 292. 392. 492. (2) *Music Performance (Major).*—Private instruction, vocal or instrumental. [0-1; 0-1]

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. (1) *Theory of Music III.*—Chromatic and contrapuntal expansions of diatonic harmony, to include tonicization and modulation, conventional chromatic chords, sequential progression, and advanced voice-leading techniques. Analysis of sonata forms. Drills in score reading. Prerequisite: Music 101. [3-0; 0-0]

201. (1) *Theory of Music IV.*—Continued study of chromatic tonal harmony, including further consideration of standard chords and devices. Study of works or section of works — *e.g.*, development sections — of fluctuant tonal contents. Continued analysis of sonata form with consideration of other large forms. Drills in score reading. Prerequisite: Music 200. [0-0; 3-0]

203. (1½) *Melody, Counterpoint, and Harmony.*—Formal, technical, and stylistic principles. Students choose between a two-hour laboratory in musicianship (sightsinging, dictation, and keyboard) and a one-hour laboratory in composition in historical styles. B.Mus. (General Studies: Elementary Education Stream) students should take the musicianship laboratory. This course is not applicable to the B.Mus. degree. Prerequisite: Music 104 or permission of the instructor. [3-1] or [3-2; 0-0]

204. (1½) *Introduction to Chromatic Harmony and 20th-Century Techniques.*—Formal, technical, and stylistic principles of chromatic tonal music and selected music of the 20th century. Students choose between a two-hour laboratory in musicianship (sightsinging, dictation, and keyboard) and a one-hour laboratory in composition in historical styles. B.Mus. (General Studies: Elementary Education Stream) students should take the musicianship laboratory. This course is not applicable to the B.Mus. degree. Prerequisite: Music 203 or permission of the instructor. [0-0; 3-1] or [3-2]

205. (1) *Aural Skills II.*—Development of aural perception in reinforcement of Music 200 and 201, which are normally taken concurrently with this course. A continuation of Music 105. Prerequisite: Music 105. [0-2; 0-2]

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. [0-1] or [0-1; 0-1]

220. (1½) *History of Music II.*—The development of European music from *circa* 1600 to *circa* 1800. Prerequisite: Music 121. [2-1; 0-0]

221. (1½) *History of Music III.*—The development of European music, and its offshoots in the Americas, from *circa* 1800 to the present. Prerequisite: Music 220. [0-0; 2-1]

225. (1½) *Masterworks of Western Music.*—A survey in one of the major genres of Western music. Not for credit toward the B.Mus. or B.A. degree in Music. [3-0]

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] or [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. Prerequisite: 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]

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. [0-1] or [0-1; 0-1]

309. (1) *Instrumentation.*—The study of string, woodwind, brass and percussion instruments; orchestral sections and scoring for various small ensembles. Activities include demonstrations of instruments, scoring projects, analysis and listening. For credit towards the B.Mus. and the B.A. in Music; not open to other students. Prerequisites: Music 201 and completion of the second-year piano requirement. [2-0; 0-0]

310. (1) *Orchestration.*—The study of orchestration through the analysis of orchestral works, listening and scoring projects. Activities also include choral arranging and scoring for stage band and wind ensemble. Prerequisite: Music 309. [0-0; 2-0]

311. (2) *Choral Conducting.*—Choral conducting techniques and practices. For credit towards the B.Mus. and the B.A. in Music; not open to other students. Prerequisites: Music 201 and completion of the second-year piano requirement. [2-0; 2-0]

312. (2) *Instrumental Conducting.*—Instrumental conducting techniques and practices. For credit towards the B.Mus. and the B.A. in Music; not open to other students. Prerequisites: Music 201 and completion of the second-year piano requirement. [2-0; 2-0]

319. (1½/3)**d** *Introduction of Electroacoustic Music.*—Study of acoustics, audio technology, and electroacoustic composition. Composition of original works using facilities of the UBC Electroacoustic Music Studio. Prerequisites: Music 201 and permission of instructor. [3-0] or [3-0; 3-0]

320. (1½) *Computer Music.*— The study of computer applications to music, focussing on digital synthesis techniques and languages, methods of algorithmic composition, and the design of music editors. Prerequisite: Music 319 or permission of instructor. [3-0]

321. (1½/3)**d** *Music Appreciation, Twentieth-Century.*—Designed for students with little or no musical background. Not for credit toward the B.Mus. or B.A. degree in Music. [3-0] or [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. Not for credit toward the B.Mus. or B.A. degree in Music. [3-0; 0-0]

325. (1½) *Music and Civilization II.*—A continuation of Music 324, dealing with Europe after 1600. Not for credit toward the B.Mus. or B.A. degree in Music. [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 for credit towards the B.Mus. or B.A. in Music degrees. [3-0] or [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. [3-0] or [3-0; 3-0]

328. (1½) *World Music Cultures.*—Introduction to the principles of ethnomusicology and an examination of two contrasting musical traditions (e.g., North American Indian and Japanese). For credit toward the B.Mus. and the B.A. in Music but open to students not majoring in music with third-year standing. Non-music students should have some knowledge of music rudiments. [3-0; 0-0]

330. (1½) *Music in Vancouver's Ethnic Communities.*—Examination of music within the ethnic context as found in the urban environment of Vancouver. The musics of several traditions (e.g., Chinese, Jewish, English folk) will be studied together with the social issues surrounding their preservation. For credit toward the B.Mus. and the B.A. in Music, but open to students not majoring in music. Prerequisite: Music 328 or permission of instructor. [0-0; 3-0]

331. (1) *Workshop in World Rhythm.*—Theory and practice of selected rhythmic systems of world music cultures, focusing on West African drumming, and including other systems such as Indian *Tala* and Peking opera percussion. Prerequisite: Music 201. [0-0; 0-3]

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. (1/2)**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. [2-1] or [2-1; 2-1]

339. (1½/3)**d** *Opera Workshop I.*—Participation in performances by the School. Open also to students outside Music without credit, after audition. [2-3; 2-3]

345. (1½) *Aesthetics and Practice of Film Music.*—Not for credit towards the B.Mus. or the B.A. in Music. [3-0]

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]

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]

365. (1) *Song Repertoire I.*—An exploration of the solo art song repertoire from 1600 to the Romantic period. Repertoire essential to the performer and teacher will be studied through live and recorded performance with special attention given to poetic content and musical style. Prerequisite: Music 221. [2-0; 2-0]

402. (1½/3)**c** *Special Projects.*—For fourth-year students who receive permission of the Director of the School of Music to do advanced studies in their Major field. [3-0] or [0-3; 0-3]

403. (1½/3)**d** *Selected Topics in Music.*—See School of Music schedule for description and prerequisites. Restricted to B. Mus. and B.A. in Music students.

406. (1/2)**d** *Conducting II.*—Advanced choral and orchestral conducting techniques and rehearsal practices. Prerequisite: Music 306. [2-0] or [2-0; 2-0]

407. (1½/3)**c** *Composition IV.*—Continuation of Music 307, First term prerequisite to second. [0-1] or [0-1; 0-1]

409. (1½) *Jazz Theory and Arranging.*— Jazz scales, chord relationships, substitutions, orchestration, listening, and score analysis. Restricted to B.Mus. and B.A. in Music students. Prerequisite: Music 201. [3-0]

410. (1½/3)**d** *Special Topics in the Analysis of Tonal Music.*—Significant 20th-century concepts and methods of analysis of 18th- and 19th-century music, explored through selected readings and practical exercises. Prerequisite: Music 301 or permission of instructor. May be repeated for credit. [3-0]

411. (1½) *Homophonic Forms.*—Study of harmonic and formal models from the late 18th and 19th centuries, with exercises in composition. Prerequisite: Music 201 or permission of instructor. [3-0]

412. (1½) *Late Romantic Harmony.*—Study of harmonic concepts and devices of highly chromatic music, with exercises in composition. Prerequisite: Music 300 or permission of instructor. [3-0]

413. (1½) *Studies in Music, 1900-1945.*—Analytical techniques and theories of pitch and rhythm appropriate to various styles emergent in the first half of the 20th century. Prerequisite: Music 301 or permission of instructor. [3-0]

414. (1½) *Baroque Counterpoint.*—Study of late 17th- and early 18th-century contrapuntal procedures and techniques, and melodic structure. Composition of representative forms. Prerequisite: Music 201 or permission of instructor. [3-0]

415. (1½) *Renaissance Counterpoint.*—Study of 16th-century contrapuntal procedures and techniques, and melodic structure. Composition of representative forms. Prerequisite: Music 201 or permission of instructor. [3-0]

417. (3) *Musical Scoring for Film.*— Addresses the practical aspects of composing music for film through assignments of written scores. Prerequisites: Music 207 and Music 319, or permission of the instructor. [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. [3-0] or [3-0; 3-0]

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. Students should consult the School as to which music culture will be covered in a particular year. Prerequisite: Music 328. [3-0] or [3-0; 3-0]

430. (1½/3)**d** *Major Composers.*—The musical works of no more than two significant composers will be examined. Specific topics will be announced; may be repeated for credit. Prerequisite: Music 221. [3-0] or [3-0; 3-0]

435. (1) *Opera Repertoire IV.*—See Music 135.

439. (1½/3)**d** *Opera Workshop II.*—A continuation of Music 339. [2-3] or [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. Restricted to B.Mus. students. [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. Restricted to B.Mus. students. [0-2; 0-2]

449. (3) *Graduating Essay.*

450. (1½/3)**d** *Selected Topics in Vocal or Instrumental Genres.*—Intensive study of one genre of music (*e.g.*, orchestral music 1760-1849; the *Lied* in Austria and Germany) through analysis and the consideration of cultural milieu and historical development. Specific topics will be announced. May be repeated for credit to a maximum of 3 units. Prerequisite: Music 201, 221. [3-0] or [3-0; 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] or [3-0; 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]

465. (1) *Song Repertoire II.*—A sequel to Music 365, exploring the solo art song repertoire from the Romantic era to the present. Prerequisite: Music 221. [2-0; 2-0]

500. (1½/3)**d** *Seminar in Analytical Techniques.*—Prerequisite: at least one of Music 410-413.

501. (1½) *Tonal Analysis in the Twentieth Century I.*—Exercises and selected readings in Schenkerian analysis: Prerequisite: at least one of Music 410-412 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: at least one of Music 410-412 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 School as to the areas of focus in any given term.

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. Prerequisite: at least one of Music 410-412 or permission of the instructor.

506. (1) *Readings in Orchestral Repertoire.*—Standard repertoire for wind and percussion players. See Divisional Coordinator for placement.

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 Director, School 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 Twentieth-Century Music.*

529. (1½) *Introduction to Ethnomusicology.*—Preliminary studies in the discipline of ethnomusicology, with an emphasis on history and orientations.

530. (1½) *Topics in Ethnomusicology.*—Topics involving methodology and fieldwork in non-Western traditions. Topics will vary and students should consult the School as to areas of focus in any given term.

531. (1½/3)**d** *Seminar in Ethnomusicology.*—Research studies in selected areas or regions of world music cultures. Prerequisite: Music 529.

532. (1½/3)**d** *Advanced Studies in Music History and Musicology.*

537. (1½/3)**d** *Seminar in the Literature of Opera.*—Special topics related to the bibliography, history, repertoire and pedagogy of operatic music. Prerequisites: 221, 301, 454, 455; Music 520 (may be taken concurrently).

538. (1½/3)**d** *Staging and Directing Opera.*—Prerequisite: Permission of instructor.

539. (3) *Opera Production.*—Stylistic and technical studies and participation in the production of opera performances. Prerequisite: Music 439.

547. (1½/3)**d** *Seminar in the Literature of Song.*—Special topics related to the bibliography, history, repertoire and pedagogy of song. Prerequisites: 221, 301, 365, 465; Music 520 (may be taken concurrently).

549. (3/6)**c** *Master's Thesis.*

Ensembles.—(Open 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) *Instrumental Collegium Musicum Ensemble.*

557. (1) *Vocal Collegium Musicum Ensemble.*

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.

Private Instruction in Music Performance, Vocal and Instrumental.

571. 671. (1) *Music Performance (Secondary).*—Private instruction, vocal or instrumental.

572. 672. (2) *Music Performance (Secondary).*—Private instruction, vocal or instrumental.

573. 673. (3) *Music Performance (Secondary).*—Private instruction, vocal or instrumental.

591. 691. (1) *Music Performance (Major).*—Private instruction, vocal or instrumental.

592. 692. (2) *Music Performance (Major).*—Private instruction, vocal or instrumental.

593. 693. (3) *Music Performance (Major).*—Private instruction, vocal or instrumental.

594. 694. (4) *Music Performance (Major).*—Private instruction, vocal or instrumental.

595. 695. (5) *Music Performance (Major).*—Private instruction, vocal or instrumental.

606. (1) *Readings in Orchestral Repertoire.*—Continuation of Music 506. See Divisional Coordinator for placement.

607. (1½/3)**c** *Composition.*—Further study for doctoral candidates in Composition.

609. (1½/3) *Advanced Orchestration and Arranging.*—Prerequisite: Music 509.

649. *Ph.D. or D.M.A. Thesis.*

Music Education (MUED)

(Faculty of Education)

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]

106. (1) *Music Curricula in Schools.*—Lectures, discussions, demonstrations, and observations of a range of music curricula. [1-2; 0-0]

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. (1½) *Advanced Music Curriculum and Instruction (Elementary).*—Philosophy, objectives, curriculum, methods, and materials for teaching music in elementary schools. Prerequisite: Music Education 320. [0-0; 3-0]

308. (1½) *Elementary Choral Music.*—Foundations for choral singing; the child voice; methods and materials for elementary singers; choral and conducting techniques. Prerequisite: Music Education 320 and ability to read music. [0-0; 0-3]

314. (2) *Curriculum and Instruction in Music: Secondary.*—Curriculum organization in music; principles and methods of instruction applied to teaching music. Prerequisite: a completed concentration in music or permission of the Head; corequisite Education 311. [2-4; 0-0]

320. (1) *Curriculum and Instruction in Music: Elementary.*—Curriculum organization in music; principles and methods of instruction applied to teaching music. Prerequisite: Education 310. [0-0; 1-2]

321. (1½) *Microcomputers in Art and Music Education.*—Experience with computer graphics and music hardware and software in a model studio setting. Lectures, tutorials, and studio work. (Same course as Art Education 321.) [1-4; 0-0] or [0-0; 1-4]

322. (1½) *Multimedia Production using Computer Graphics and Midi-controlled Synthesizers.*—Application of skills and experience with digital equipment and software to a creative project exploring relationships between musical and visual media. Studio work. (Same course as Art Education 322.) Prerequisite: Music Education 321. [1-4; 0-0] or [0-0; 1-4]

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]

335. (1) *Orff Basics.*—Introduction to the Orff approach to Music Education. Prerequisite: Music Education 320. [0-0; 0-2]

336. (1) *Kodaly I.*—Introduction to the Kodaly approach to Music Education. Prerequisite: Music Education 320. [0-0; 0-2]

339. (1½) *The Musical.*—Organization and production of school musicals. [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]

345. (3) *Education Through Music I.*—Musical elements, studied through the song-experience games of English language folk literature, as appropriate for Kindergarten – Grade 8. Rhythm, melody, harmony, and expressive musical elements. Application to movement and to social, linguistic, and cognitive growth of both children and adults. Aural musicianship, philosophy, and pedagogy. Prerequisite: Music Education 320. Offered during Summer Session only.

401. (1) *Arranging for Chorus, Band, and Orchestra.*—Arranging, instrumentation, and scoring for concert and stage bands and choirs. Arranging styles and principles. Problems of rhythm, meter, and chord structures and progressions. Pre- or co-requisite: Music Education 302 and Music 309. [0-0; 1-2]

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. Corequisite: 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]

435. (3) *Orff Level I.*—The Orff Schulwerk curriculum: with attention to movement and to instrumental and choral music. Rhythm, melody, harmony, timbre, and form. Aural musicianship, philosophy, and pedagogy. Prerequisite: Music Education 335 or music rudiments (Grade II, Toronto Conservatory; Grade IV, Western Board; or equivalent). Offered during Summer Session only.

436. (1) *Kodaly II.*—Advanced study of Kodaly methods, strategies, and curricula. Prerequisite: Music Education 336. [0-0; 0-2]

437. (3) *Orff Level II.*—The Orff Schulwerk curriculum with attention to increasingly more complex musical forms and approaches and to improvisation. Prerequisite: Music Education 435. Offered during Summer Session only.

438. (3) *Orff Level III.*— Advanced studies of the Orff Schulwerk curriculum and pedagogy with peer practice teaching. Prerequisite: Music Education 437. Offered during Summer Session only.

445. (3) *Education Through Music II.*— Further studies of the song-experience games of English language folk literature. Piaget's theories of thinking and learning music in relation to language acquisition. Attention to vocal and instrumental literature of the 18th and 19th centuries. Aural musicianship, reading and writing music, philosophy, and pedagogy. Prerequisite: Music Education 345. Offered during Summer Session only.

446. (3) *Education Through Music III.*— Advanced studies of musical elements through the song-experience games of English language folk literature, focussing on the vocal and instrumental literature of the 18th, 19th, and 20th centuries. Attention to aesthetic experiences as a foundation for education. Aural musicianship, reading and writing music, analysis, philosophy, and pedagogy. Prerequisite: Music Education 445. Offered during Summer Session only.

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

(Department of Mechanical Engineering, Faculty of Applied Science)

Neuroscience (NRSC)

(Faculty of Graduate Studies)

500. (3) *Neuroscience I.*—Comprehensive multidisciplinary course with lectures, seminars, and laboratory demonstrations encompassing molecular, cellular, systemic, and behavioural approaches to the study of nervous systems. Emphasis is on the physiology, pharmacology, and biochemistry of excitable cells and their synaptic interactions. Permission of Neuroscience Chairman is required. (Normally to be taken in conjunction with Neuroscience 501.)

501. (3) *Neuroscience II.*—Continuation of Neuroscience 500 with emphasis on the integrative functions of the brain, behaviour, and selected neural disorders. Permission of Neuroscience Chairman is required. (Normally to be taken in conjunction with Neuroscience 500.)

549. (6) *Master's Thesis.*

649. *Ph.D. Thesis.*

Nursing (NURS)

(School of Nursing, Faculty of Applied Science)

Note: 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.

105. (1) *Professional Nursing in Contemporary Society I.*—Beginning study of the nursing profession and characteristics of professional practice. [2-1-0; 0-0-0]

130. (1½) *Introduction to Nursing Care I.*—Beginning study of professional nursing practice, using the UBG Model for Nursing (Individual). [2-0-3; 0-0-0]

131. (2) *Introduction to Nursing Care II.*—Study and application of selected concepts, skills and processes basic to the practice of nursing. Prerequisite: Nursing 130. [0-0-0; 2-0-6]

202. (2) *Core Concepts in Nursing.*—Study of core concepts pertaining to the care of individuals experiencing critical periods in the life cycle. [3-2-0; 0-0-0]

230. (3) *Nursing Care of Adults.*—Theory and practice related to the nursing care of young and middle-aged adults in acute care, ambulatory care and community settings. Prerequisite or corequisite: Nursing 202. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

231. (3) *Nursing Care of Older Adults.*—Theory and practice related to the nursing care of older adults in acute care, ambulatory care and community settings. Prerequisite or corequisite: Nursing 202. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

302. (3) *The Process of Nursing I.*—Introduction to the UBC Model and related concepts, skills and processes basic to the practice of professional nursing. Students build upon previously acquired knowledge and skills with selected clients. *Note:* Registered Nurse students only. [2-2-9; 0-0-0]

303. (2) *Family and Community Nursing.*—Study of theories, concepts and processes basic to the nursing care of families, with application in seminar settings and clinical practice. Corequisites: Nursing 333, 334 or 335. [0-0-0; 2-2-3]

304. (1½) *Introduction to Nursing Research.*—Study of the research process and application of research findings to nursing practice. It is strongly recommended that Statistics 203 be taken prior to or concurrently with Nursing 304. [0-0-0; 2-2-0]

305. (1) *Professional Nursing in Contemporary Society II.*—Study of the professional practice of nursing. Analysis of societal and health care contexts within which nursing has evolved and is practiced. [1-2-0; 0-0-0]

333. (3) *Nursing Care of Children.*—Study and application of concepts, skills and processes basic to the nursing care of children experiencing critical periods. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

334. (3) *Nursing Care of Individuals in the Childbearing Cycle.*—Study and application of concepts, skills and processes basic to the nursing care of individuals during the childbearing cycle. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

335. (3) *The Process of Nursing II.*—Study and application of theory and concepts related to the nursing care of clients experiencing critical periods in a variety of settings. Students will contract to meet own learning needs and develop communication and teaching abilities. *Note:* Registered Nurse students only. Prerequisite: Nursing 302. Corequisite: Nursing 303. [0-0-0; 3-0-12]

405. (1) *Issues in Professional Nursing.*—Study of the nursing profession and its role in Canadian society. Analysis of issues related to the development of the profession. Prerequisite: Nursing 105 and/or 305. [0-0-0; 1-2-0]

406. (1½) *Management in Nursing Practice.*—Study of theories, principles and skills related to planned change, management and leadership as they affect the provision of nursing care. [2-2-0; 0-0-0]

408. (1½/3)**c** *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. Prerequisite: completion of third year nursing courses.

409. (1½/3)**c** *Clinical Nursing Elective.*—An opportunity to increase knowledge and skills in an identified area of clinical interest in nursing. Students work under the guidance of faculty with expertise in the area. Prerequisite: completion of third year nursing courses.

426. (1½) *Nursing and the Health of Communities.*—Study of epidemiological concepts as they relate to the health of Canadian communities. Application of concepts to the planning of health care programs. Prerequisites: Nursing 304, Nursing 303 and Nursing 333 (generic students). [3-0-0; 0-0-0]

432. (3) *Nursing of Adults and Families with Mental Health Concerns I.*—Study and application of theories, concepts, skills and processes in the care of individuals and families with mental health concerns. Clinical practice in acute care, ambulatory care and community settings. *Note:* for generic students only. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

440. (3) *Nursing Care of Adults and Families Experiencing Acute and Long-term Disabilities.*—Advanced nursing practice with individuals and families experiencing acute and long-term disabilities. Application of theories and concepts in acute, ambulatory, long-term care and community settings. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

441. (3) *Nursing Care of Older Adults and their Families.*—Advanced nursing practice with older adults and their families. Application of theories and concepts in acute, intermediate, long-term care and community settings. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

442. (3) *Nursing Care of Adults and Families with Mental Health Concerns II.*—Advanced nursing practice with clients with mental health concerns. Application of theories and concepts in a variety of settings. Prerequisite: generic students only, Nursing 432. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

443. (3) *Nursing Care of Children and their Families.*—Further study and application of concepts, skills and processes basic to the nursing care of children and families experiencing critical periods. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

444. (3) *Nursing Care of Childbearing Families.*—Further study and application of concepts, skills and processes basic to the care of childbearing families, with an emphasis on unpredictable events. [2-0-12; 0-0-0] or [0-0-0; 2-0-12]

445. (0) *Extended Practicum in Professional Nursing.*—A three-week (120 hour) practicum in nursing to be completed in April/May prior to graduation. This practicum is designed to assist students to consolidate knowledge and skills acquired in previous theory and clinical courses and to facilitate socialization into the role of the baccalaureate prepared nurse.

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. Prerequisite or corequisite: NURS 510 and one of STAT 303, HCEP 400 or EDPS 592. [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. Prerequisites: Nursing 510, 542 and 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. Prerequisites: Nursing 522, 542, 546 and 548. [2-12; 2-12]

590. (1½/3)c *Directed Studies in Nursing.* Prerequisites: NURS 522, 542 and 546.

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.* Prerequisites: NURS 510, 522 and 542.

Obstetrics and Gynaecology (OBST)

(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: Lectures on normal and abnormal obstetrics. Gynaecology: Lectures on common gynaecological disorders. Seminar and patient-oriented teaching and demonstrations to small groups of students supplement lectures.

475. *Obstetrics and Gynaecology Clinical Clerkship.*—Six weeks' experience in two different hospitals. Patient care responsibilities are complimented by scheduled rounds and seminars. Gynaecology: Common problems in ambulatory care and surgical gynaecology. Obstetrics: Clinical experience in the delivery of antenatal care including high risk conditions, as well as intrapartum and post-partum care.

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) *Perinatal Physiology.*—(i) Fetal growth and development; (ii) physiology and pathology of labour.

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.

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.*—An elective 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.*—An elective experience in the Division of Sexual Medicine 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.*—Problems and possible pitfalls of the high-risk pregnancy and maternal and neonatal management, selected from current clinical problems in the Intensive Care Nursery. Emphasis on possible neonatal consequences of maternal management and considerations to be communicated to the Obstetrician antenatally. 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 course, pathological findings and preventable aspects. 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 (OCGY)

(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. Co-requisite: Biology 302 or permission of Head of Department, (Biology 305/Oceanography 316 are the same course). [2-0-1; 0-0-0]

405. (1½) *Introductory Dynamical Oceanography.*—Physical properties of seawater, 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 414. Credit may be obtained for only one of Oceanography 414 and 405. [3-0; 0-0]

406. (1½) *Aquatic Ecology II.*—Analytical techniques and field operations as used in biological oceanography. Pre- or co-requisite: Oceanography 316/Biology 305, or permission of Head of Department. Biology 403/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. Co-requisite: Oceanography 414 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]

411. (1½) *Atmospheric Dynamics.*—Applications of dynamical principles to motions in the atmosphere. Topics include the planetary boundary layer, synoptic-scale motions, cyclogenesis, convection and the general circulation, and numerical weather prediction. Prerequisites: PHYS 312 or MATH 316, and ATSC/GEOG 200, 301. (Same as ATSC 411.) [0-0; 3-0]

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. Prerequisites: Microbiology 200 or permission of Head of Department. [0-0; 2-0]

413. (1½) *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. [3-0; 0-0]

414. (1½) *Geophysical Fluid Dynamics.*—The fundamental principles governing the flow of a density-stratified fluid on a rotating planet, with applications to the motions of the ocean and atmosphere. Prerequisite: PHYS 312 or MATH 316. (Same as ATSC 414.) [3-0; 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: Biology 320 and one of Biology 351/352, Biology 350 or Biology 201 (may be taken concurrently). Same as Biology 451. [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. (1-3)d *Seminar in Physical Oceanography.*—Oral presentations by students of current research of their own or from the literature. Topics chosen in consultation with faculty.

502. (1) *Marine Geochemistry.*—Geochemistry of marine sediments and geochemical cycles in the ocean.

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.

511. (1) *Inorganic Chemical Tracers in the Study of Marine Systems.*—The chemical composition of seawater, cycles of gases, trace metals and radionuclides within the sea, chemical tracers in the study of water mixing, water movement and changes in ocean currents over time.

512. (1) *Inorganic Chemical Processes in the Marine Environment.*—The solution chemistry of seawater, chemical speciation in natural waters, thermodynamic and kinetic 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.*—Dynamics of steady ocean circulation and low frequency fluid motion on a rotating earth. 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) *Advanced Physical Oceanography.*—Topics in waves, eddies and ocean circulation. Prerequisite or corequisite: OCGY 514. 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 (OPTH)

(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.

425. *Introduction to Ophthalmology.*—Background skills of ophthalmological examination of patients.

450. *Ophthalmology.*—Third year Medicine Students only: An introduction to Clinical Ophthalmology. Four 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 Medical and Surgical Sciences

See course listings under Dentistry.

Orthopaedics (ORPA)

(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.

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.

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 (PAED)
(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 days a week for a one-month 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 are held for four weeks. The students are encouraged to follow up their cases insofar as time allows.

451. *Paediatric Infection and Immunity.*—Pathophysiology of infection and the immune response in the young host. Third year elective.

452. (1½) *Health Problems in the Adolescent.*—A review with particular regard to application of Behavioral Sciences. Third year elective.

475. *Paediatrics.*—Students are assigned to the Department of Paediatrics for 6 weeks. They are responsible for patient histories, physical examinations, participate in investigation and management, and follow patient progress under direct Resident and Staff supervision. They take part in daily rounds of their ward and the Department. On evenings and weekends, students are on duty on a regular rotation to observe and participate, under supervision, in the care of newly-admitted patients.

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 (PATH)
(Faculty of Medicine)

230. (1) *Applied Medical Microbiology.*—Lectures and seminars in the hospital microbiology laboratory concerning the laboratory diagnosis of micro-organisms from selected categories of patients each normal working day.

300. (2) *Background to Medical Laboratory Science.*—Introductory lectures and laboratory sessions in clinical chemistry, haematology and blood banking, preparation and examination of tissue sections. For Medical Laboratory Science students without previous experience in hospital laboratories. Prerequisites: BIOL 200, 201; CHEM 205, 230; MICB 200. [3-4; 0-0]

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, haematology, etc.

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.

306. (1) *Nuclear Medicine for Medical Laboratory Scientists.*—Introductory Nuclear Medicine with specific reference to the Pathology laboratory.

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.

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.

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.

Radiation Oncology (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.

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.

Theatre (THTR)

(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]

150. (3) *Introduction to Technical Theatre.*—Foundation study of the technical aspects of theatre production. Participation in departmental productions required. [2-2; 2-2]

160. (3) *Introduction to Acting.*—Open to all students on audition. [2-2; 2-2]

220. (3) *Play-Interpretation and Production-Analysis.*—Basic methods of interpreting dramatic texts and analyzing plays in performance. 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]

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. [2-2; 2-2]

233. (1½) *Introductory Film and Television Production.*—A beginning course designed for students with no previous experience in production. The course will familiarize them with basic equipment and tools, and introduce them to the elementary principles of production. Preference given to those who are taking Theatre 230 concurrently. [1-2]

250. (3) *Technical Theatre 1A.*—The planning and execution of scenery, costumes, properties, lighting, and sound for the stage. Prerequisite: Theatre 150; corequisite: Theatre 251. [2-3; 2-3]

251. (3) *Technical Theatre 1B.*—The operation and running of scenery, costumes, lighting, and sound for the stage. Participation in departmental productions is required. Prerequisite: Theatre 150; corequisite: Theatre 250. [2-3; 2-3]

260. (3) *Acting — The Rehearsal Process.*—Textual analysis and performance of short scenes. Prerequisite: Theatre 160. Audition required. The plays presented in the Frederic Wood Theatre during its Winter season will be studied in this course; students must obtain season tickets during registration. Not open to B.F.A. (Acting) students. [2-2; 2-2]

261. (3) *Beginning B.F.A. Acting.*—A study of the actor's basic technique through improvisation and textual analysis. 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. Prerequisite: Theatre 160. Audition required. To be taken in conjunction with Theatre 262. Open only to B.F.A. (Acting) students. [2-3; 2-3]

262. (3) *Beginning 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]

305. (3) *Introduction to Design for the Theatre.*—The graphic skills and aesthetic principles involved in scenery and costume design. Prerequisite: permission of the instructor. [2-3; 2-3]

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. (1½/3)**d** *History of Canadian Theatre.* [3-0] or [3-0; 3-0]

330. (3) *History of the Film.*—Study of the development of film from its origin to the present, including the pre-history of film, silent film, the introduction of sound, the major movements and film makers of the last 90 years. (Also listed as Fine Arts 393.) [2-2; 2-2]

333. (3) *Intermediate Film and Television Production.*—Practical film-making course, with instruction in the use of 16mm film and half-inch videotape format. Prerequisite: Theatre 230 and permission of the instructor. [2-3; 2-3]

334. (3) *Animation.*—History, theory, technique, and design of animated films. Prerequisite: Theatre 230 and permission of the instructor. [2-3; 2-3]

340. (3) *History of the Oriental Theatre.*—Open to all students in third year and above. [3-0; 3-0]

345. (3) *Theatrical Production.*—A survey of the practical aspects of theatre production. Not open to students with Theatre 150 or 250. [2-2; 2-2]

350. (1½) *Scenery.*—Scenery construction, rigging, and systems. Prerequisite: permission of the instructor. [2-2; 0-0]

351. (1½) *Stage Lighting.*—The principles and history of the optical, distribution, and control systems used in stage lighting. Prerequisite: permission of the instructor. [2-2; 0-0]

352. (1½) *Scene Painting.*—Media, techniques, and textural treatments used in scene painting. Prerequisite: permission of the instructor. [2-2; 0-0]

353. (1½) *Costume.*—The construction and history of theatrical costume and accessories. Prerequisite: permission of the instructor. [2-2; 0-0]

354. (1½) *Stage Management.*—Principles and procedures of stage management: organizations, systems, and operations. Prerequisite: permission of the instructor. [2-2; 0-0]

360. (3) *The Role: Interpretation and Characterization.*—Emphasis will be on externalizing the inner character in conjunction with work in textual analysis, improvisation and internal techniques. Prerequisite: Theatre 260 and permission of the instructor. Not open to B.F.A. (Acting) students. [2-2; 2-2]

361. (3) *Intermediate B.F.A. Acting.*—Character and styles in acting. Prerequisite: Theatre 261 and 262. To be taken in conjunction with Theatre 362 and 370. Open only to B.F.A. (Acting) students. [2-3; 2-3]

362. (3) *Intermediate 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 160 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 and 362. Open only to students in the B.F.A. (Acting) program. [2-2; 2-2]

400. (3) *Direction and Staging.*—Prerequisite: Theatre 160 and permission of the instructor. [3-2; 3-2]

405. (1½) *Scenery and Costume Design.*—Advanced study of design principles, history, and practice. Intensive development of student's portfolio. Prerequisite: Theatre 305. [2-2; 0-0]

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 permission of the instructor. [3-0; 3-0]

433. (6) *Advanced Film and Television Production.*—Advanced instruction in professional film and television production techniques. Prerequisite: Theatre 333 and permission of the instructor. Students are responsible for production costs. [5-1; 5-1]

434. (3-6)**d** *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. Prerequisites: Theatre 230 and permission of the instructor. [3-0; 3-0]

449. (3) *Supervised Study and Honours Essay.*

450. (1½) *Advanced Scenery.*—Technical direction; complex techniques and problems in scenery production. Prerequisites: Theatre 305 and 350. [0-0; 2-2]

451. (1½) *Advanced Stage Lighting.*—Aesthetic principles, organizational methods, and graphic skills involved in lighting design for the stage. Prerequisites: Theatre 305 and 351. [0-0; 2-2]

452. (1½) *Advanced Scene Painting.*—Scenic art; emphasis on trompe l'oeil, selected historic styles, and large-scale drops. Prerequisites: Theatre 305 and 352. [0-0; 2-2]

453. (1½) *Advanced Costume.*—Complex problems and selected historical studies in theatrical costume design and construction. Prerequisites: Theatre 305 and 353. [0-0; 2-2]

454. (1½) *Advanced Stage Management.*—Complex problems in stage and production management: script analysis, crew supervision, management procedures. Prerequisites: Theatre 305 and 354. [0-0; 2-2]

459. (3) *Advanced Technical Practice.*—Directed advanced work in actual production. May involve production internships at other theatres. Open only to fourth-year Design/Technical B.F.A. students. [0-6; 0-6]

460. (3) *Styles in Acting.*—An introduction to styles of acting in various historical periods. Prerequisite: Theatre 360 and permission of the instructor. Not open to B.F.A. (Acting) students. [2-2; 2-2]

461. (3) *Advanced B.F.A. Acting.*—Performance and characterization in contemporary media and in leading and supporting roles in full-length plays. Prerequisite: Theatre 361 and 362. Must be taken in conjunction with Theatre 462 and 470. Open only to B.F.A. (Acting) students. [2-3; 2-3]

462. (3) *Advanced 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 361 and 362 and 370. Must be taken in conjunction with Theatre 461 and 462. Open only to students in the B.F.A. (Acting) program. [2-2; 2-2]

500. (1½) *Bibliography and Research Methods.*

505. (3) *Design Studio I.*—Investigation of colour, texture, and light in scenery and costume design.

506. (3) *Design Studio II.*—Advanced studio work in scenery and costume design for theatre, opera, and dance.

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) *Studies in Historic Design.*—Seminar in theatre scenery, costumes, and architecture of selected historical periods. Pre- or co-requisite: Theatre 505.

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 (UKRN)

(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 (URST)

(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 viewpoints of several disciplines. Prerequisite: permission of the instructor. [0-0; 1-2]

Urdu—See Asian Studies: South Asian Languages.

Women's Studies (WMST)

(Faculty of Arts)

For other acceptable courses, see Index under Women's Studies.

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]

Wood Science and Industry (WOOD)

(Department of Harvesting and Wood Science, Faculty of Forestry)

280. (½) *Wood Identification Laboratory.*—A series of 6 two hour practical laboratories on macroscopic identification of important commercial gymnosperm and angiosperm woods. Prerequisite: Forestry 111. [0-2; 0-0]

335. (1½) *Principles of Industrial Quality Control.*—Statistical quality control methods, acceptance sampling inspection, and economic aspects of quality control. Prerequisites: Forestry 131 or Mathematics/Statistics 205 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 or Third 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. Offered in May 1988 and in alternate years thereafter. 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. Prerequisites: Wood Science and Industry 280 and 372. [0-0; 3-2]

372. (1½) *Wood Physics.*—Properties related to anatomy, variability in behaviour, processing and use of wood and pulp: wood-moisture relations growth characteristics; anisotropy; thermal, electrical and acoustical properties; application of these principles to practical situations. Prerequisite: Wood Science and Industry 280. [2-2; 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]

376. (1½) *Mechanics of Wood Products.*—Introduction to the strength of materials with emphasis on the bending, shear, compression and column buckling behaviour of structural wood products; effects of material variability, temperature, moisture and time-dependent behaviour on the elastic properties and ultimate strength of wood and wood products. Prerequisites: Physics 170 and Wood Science and Industry 372. [0-0; 2-2]

377. (1½) *Wood Microscopic Properties and Ultrastructure.*—Comparative microscopic anatomy of wood; histological methods and light and electron microscopic techniques for wood observation. Offered in 1987/88 and in alternate years thereafter. Prerequisite: Wood Science and Industry 280. [0-0; 2-4]

461. (1½) *Wood Products Marketing.*—Industry structure, competitive environment and strategic options of major segments of the North American wood products industry; examination of major N.A. companies. Prerequisites: Economics 100, and Commerce 396. [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: Wood Science and Industry 280 or 475. [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]

475. (1½) *Wood Properties, Identification and Uses.*—Elementary chemical, physical and mechanical properties of wood and their variations in relation to structure; identification by hand lens features; manufacture of lumber, pulp and composite wood products. (Not available for credit to Wood Science and Industry students.) Prerequisite: Forestry 111. [3-2; 0-0]

476. (1½) *Timber Structures and Design.*—Design of engineered structural elements using limit states and working stress design principles with emphasis on wood, load duration, stress grades, sawn and glued laminated members, deflection, elastic instability, combined loads, timber joints, fasteners and light-frame systems. Prerequisites: Wood Science and Industry 376 or Civil Engineering 230. [2-2; 0-0]

482. (1) *Wood Drying and Finishing.*—Principles and methods of seasoning of forest products; principles of finishing wood. Prerequisite: Wood Science and Industry 372. [0-0; 2-2]

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. Prerequisites: Wood Science and Industry 372 and 376. [2-3; 0-0]

487. (1½) *Glued Wood Products.*—Physical, chemical and mechanical variables involved in cold, hot and non-conventional adhesive bonding of wood; preparation and characteristics of adhesives; plywood, composite wood panels, hardboard, medium density fibreboard and laminated wood manufacturing processes; important physical and chemical properties of products; methods of prefinishing. Prerequisites: Wood Science and Industry 280 and 372. [0-0; 2-3]

488. (1½) *Analysis of Sawmill Operations.*—Principles of log and lumber grading and measurement. Introduction to methods for: estimating production rates and yield of lumber and residue; cost accounting investment analysis; marginal log analysis; micro-computer applications of sawmill simulators and other analytical software. Corequisites: Forestry 332 and 333. [2-2; 0-0]

Zoology (ZOOL)

(Faculty of Science)

All undergraduate courses in ZOOLOGY are listed under BIOLOGY.

Note: The following courses have been renumbered and transferred to Biology (old Zoology numbers in brackets): (203) 204, (303) 353, (304) 331, (305) 326, (306) 325, (307) 354, (311) 327, (316) 305, (323) 310, (325) 337, (340) 347, (400) 446, (402) 414, (403) 404, (404) 402, (405) 450, (406) 403, (407) 431, (408) 453, (409) 440, (411) 425, (412) 413, (413) 328, (415) 426, (416) 427, (417) 437, (419) 441, (420) 435, (421) 408, (423) 410, (425) 432, (427) 430, (428) 454, (429) 455, (430) 409, (431) 456, (440) 447.

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.*—Seminar discussion of topics in comparative animal physiology. Primarily for graduate students in Zoology.

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: Biology 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: Biology 328. (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.

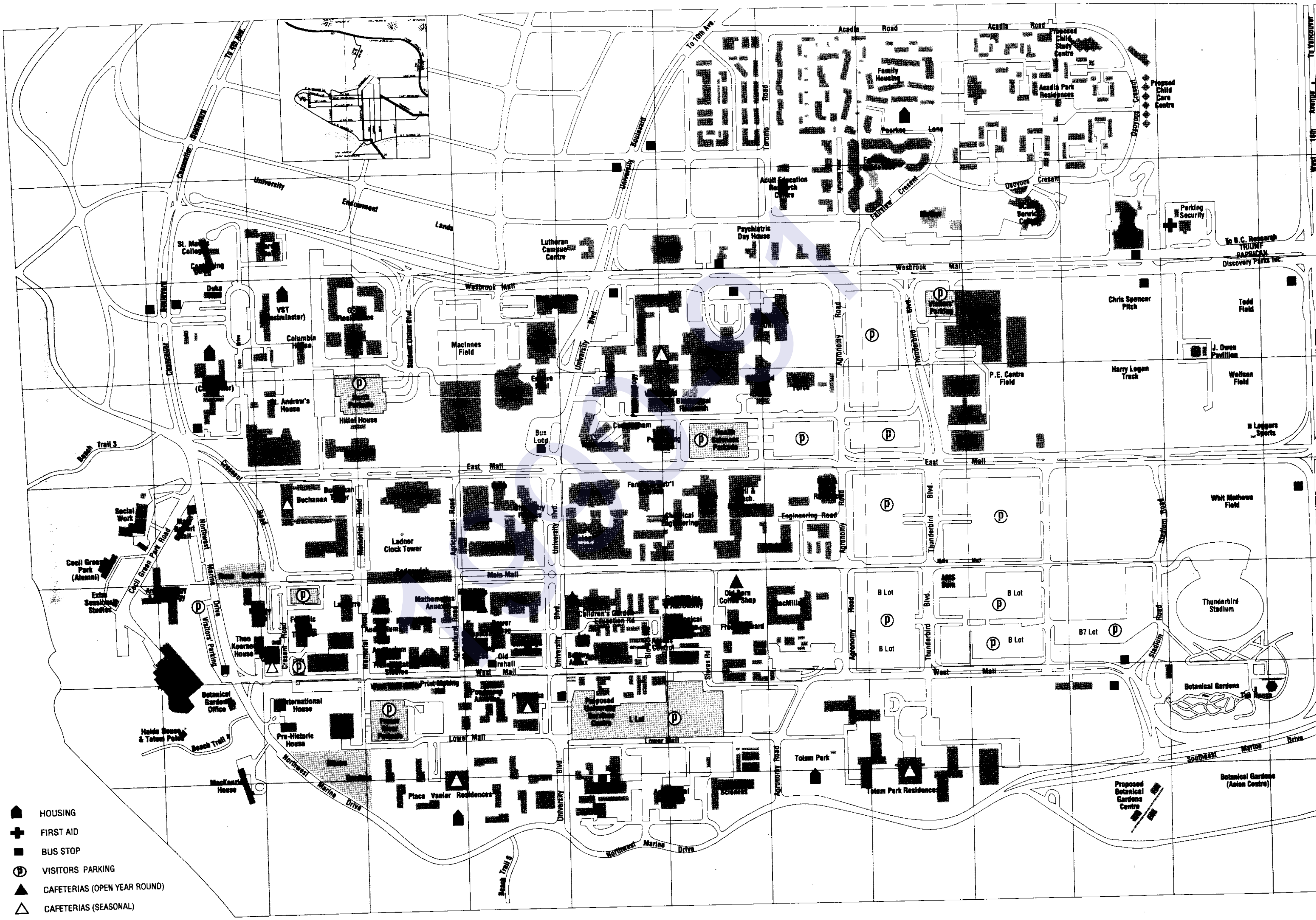
532. (2) *Mammalogy.*—Phylogeny, morphology, and biology of mammals; factors affecting their abundance and distribution. Offered in alternate years.

533. (2) *Problems in Wildlife Population Ecology.*

549. (3/6/9)**c** *M.Sc. Thesis.*

649. *Ph.D. Thesis.*

Index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VST (Westminster)
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Macinnes Field
St. Andrew's House
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Harry Logan Track
Wolfson Field
Bus Loop
East Mall
Beach Trail 3
Crescent Road
Buchanan Tower
Social Work
Cecil Green Park Road
Cecil Green Park (Alumni)
Northwest Marine Drive
Ladner Clock Tower
Agricultural Road
Memorial Road
University Blvd.
Engineering Road
Chemical Engineering
Whit Mathews Field
Stadium Road
Main Mall
Old Barn Coffee Shop
B Lot
B7 Lot
Thunderbird Stadium
Mathematics Annex
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International House
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Haida House & Totem Poles
Beach Trail 6
Lower Mall
Totem Park
Totem Park Residences
Southeast Marine Drive
Botanical Gardens (Asian Centre)
Proposed Botanical Gardens Centre
MacKenzie House
Place Vanier Residences
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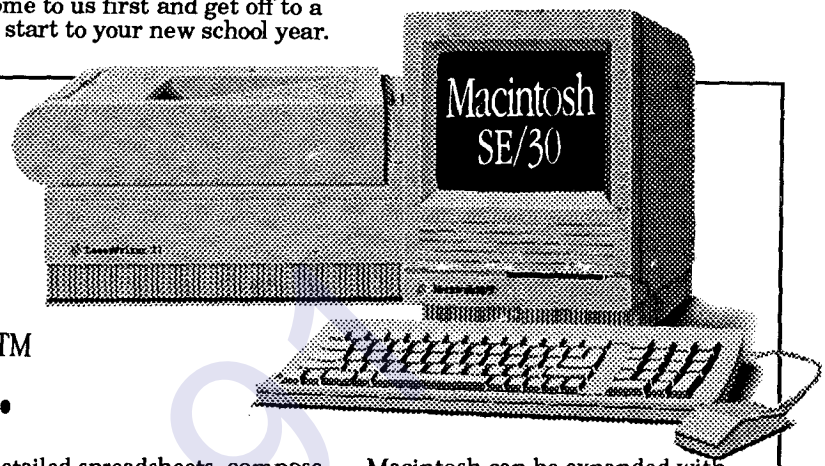

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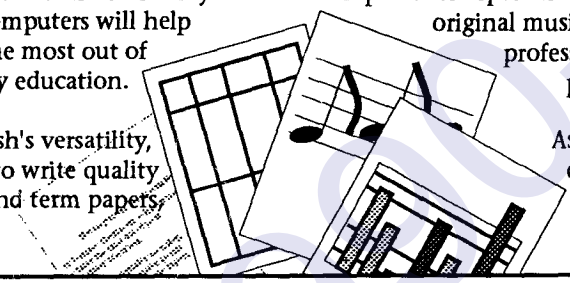

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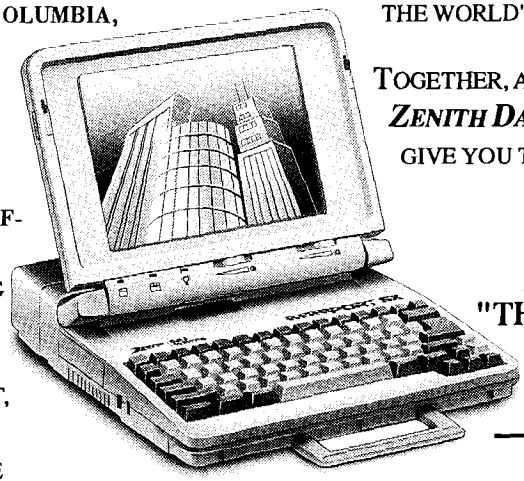

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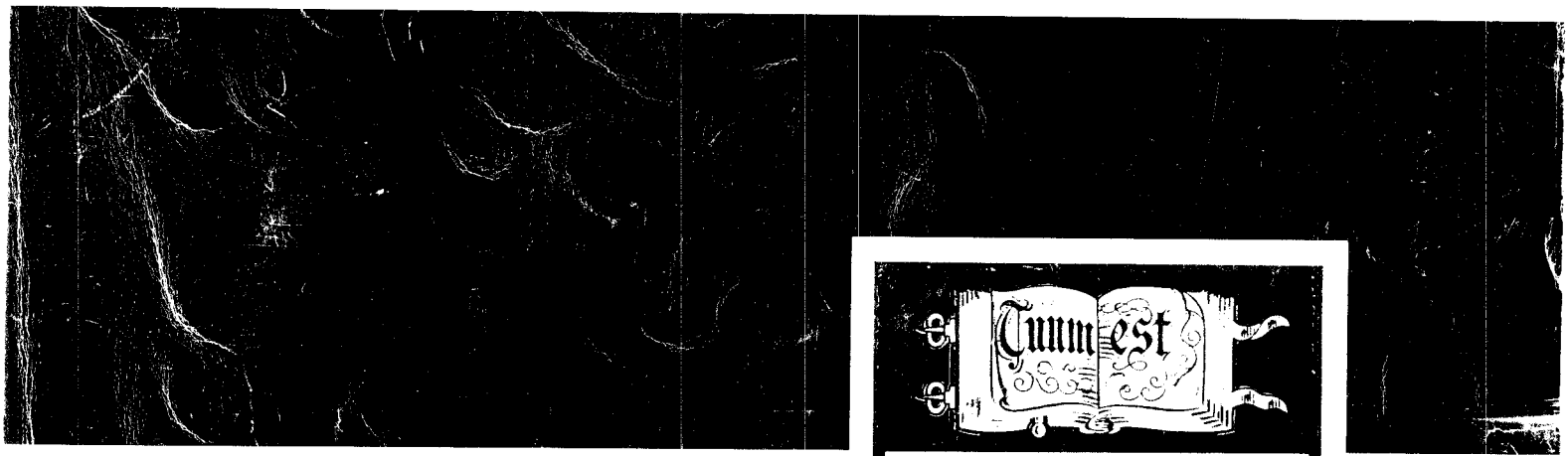

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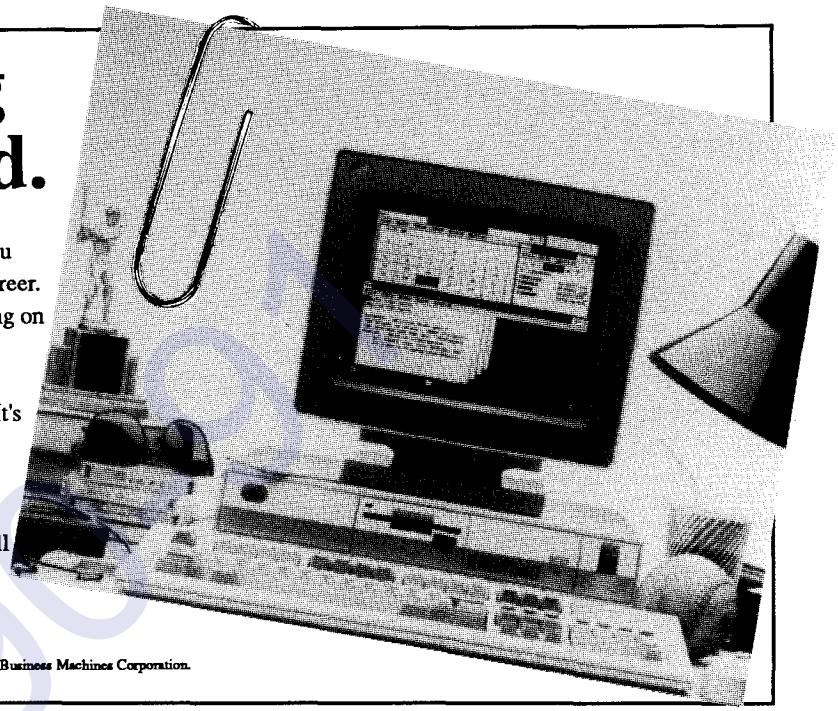

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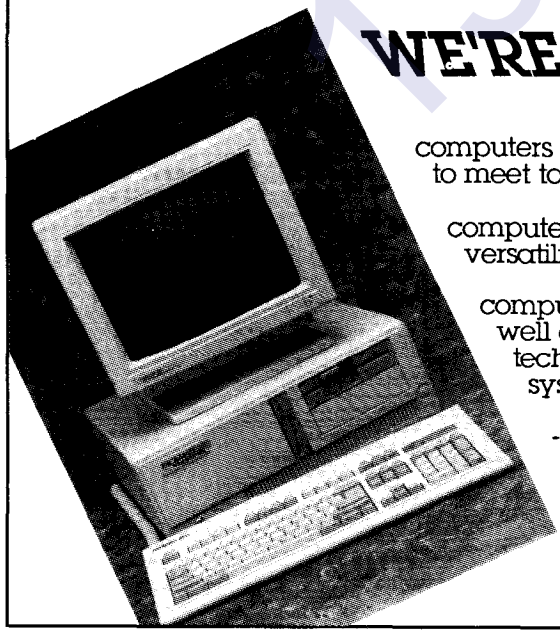

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