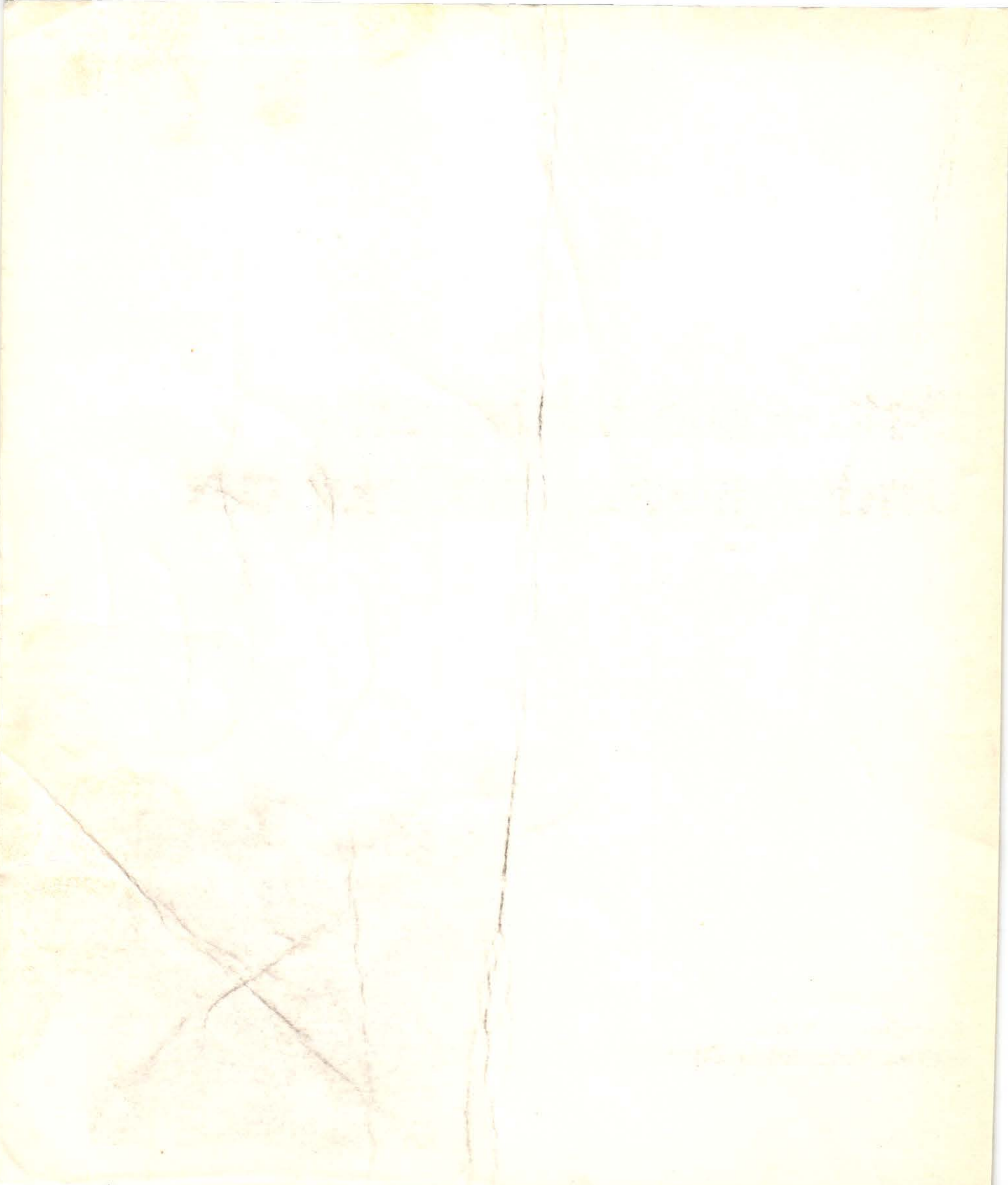


Calendar

ARTS & SCIENCE, DENTAL
HYGIENE, HEALTH PROFESSIONS,
AND MANAGEMENT STUDIES



**Dalhousie
University 1985-86**



Dalhousie University Undergraduate Calendar

Founded in 1818
Halifax, Nova Scotia, Canada



Notices

All readers and prospective students are advised that the matters dealt with in this calendar are subject to continuing review and revision. This Calendar is printed some months before the year for which it is intended to provide guidance.

Any reference to courses or classes contained herein is a statement of courses or classes that have been taught at Dalhousie University in the past. Dalhousie University assumes no obligation to continue to teach such courses or classes and prospective students are asked to consult with the respective Faculty to determine any changes to a course or class description contained herein.

Dalhousie University reserves the right to delete, revise or add to anything described in this Calendar without notice, other than through the regular processes of Dalhousie University, and every student accepted for registration in the University shall be deemed to have agreed to any such deletion, revision or addition whether made before or after said acceptance.

The University reserves the right to limit enrollment in any program. Prospective students should note carefully the application deadlines indicated for the various programs. They should be aware that enrollment in most programs is limited and that students who are admitted to programs at Dalhousie are normally required to pay deposits on tuition fees to confirm their acceptance of offers of admission. These deposits may be either non-refundable or refundable in part, depending on the program in question. While the University will make every reasonable effort to offer classes as required within programs, prospective students should note that admission to a degree or other program does not guarantee admission to any given class, except those specified as required, within that program. Students should select optional classes early in order to ensure that classes are taken at the most appropriate time within their schedule. In some fields of study, admission to upper level classes may require more than minimal standing in prerequisite classes.

Inquiries regarding Academic Matters should be directed to:

The Registrar
Dalhousie University
Halifax, Nova Scotia
Canada
B3H 4H6
902-424-7068

Table of Contents

Almanac	4
Admission Application Dates	7
The Campus Map	8
Dalhousie University	9
General Information	11
University Regulations	14
Fees	16
Faculty of Arts & Science	
Introduction	21
Faculty Regulations	21
Admission Requirements	22
African Studies	31
Ancient History	32
Anthropology	32
Architecture	32
Biochemistry	32
Biology	34
Canadian Studies Program	43
Chemistry	43
Classics	48
Comparative Literature	51
Computing Science	52
Economics	55
Education	59
Engineering	67
English	69
French	73
Geology	77
German	81
Health Education	82
History	82
Humanistic Studies in Science	88
International Development Studies	88
Linguistics	90
Marine Biology	90
Mathematics, Statistics and Computing Science	91
Mediaeval Studies	99
Meteorology	100
Microbiology	100
Music	102
Oceanography	108
Philosophy	109
Physics	113
Political Science	118

Psychology	124
Religion	128
Russian	129
Russian Studies Program	131
Sociology and Social Anthropology	132
Spanish	137
Statistics	140
Theatre	140
Costume Studies	143
Transition Year Program	143
Women's Studies	144

School of Dental Hygiene

Faculty of Health Professions

General Regulations	148
School of Nursing	149
School of Occupational Therapy	153
College of Pharmacy	159
School of Physiotherapy	165
School of Recreation, Physical & Health Education	170
The Maritime School of Social Work	180

Faculty of Management Studies

School of Business Administration	186
School of Public Administration	194

Institutes and Centres

Continuing Education

The Board of Governors

Index

Almanac 1985-86

May

Friday, 3: Senate meeting to consider candidates for the award of degrees in Arts and Science, Management Studies, Health Professions and Graduate Studies.

Saturday, 4: Examinations end, Law

Monday, 6: Level I fieldwork (2nd year, 4 weeks) and Level II fieldwork (3rd year, 8 weeks) begin, *School of Occupational Therapy*.

Thursday, 9: University Convocation (Management Studies, Health Professions and Graduate Studies).

Friday, 10: University Convocation (Arts and Science and Graduate Studies).

Monday, 13: Summer School (first session) registration and classes begin. Senate meeting to consider candidates in the award of degrees in Medicine, Spring 1985.

Thursday, 16: Last day for cancelling registration in "A" classes, first summer session.

Friday, 17: Last day for cancelling registration in "R" or "C" classes, first summer session.

University Convocation (Medicine).
Senate meeting to consider candidates for the award of degrees in Law and Dentistry.

Sunday, 19 — Tuesday, 21: Post-college assembly, Dentistry.

Monday, 20: Victoria Day

Wednesday, 22: University Convocation (Dentistry and Graduate Studies).

Friday, 24: University Convocation (Law and Graduate Studies).

Monday, 27: Examinations begin Dentistry (first and second years).

Tuesday, 28: Last day for withdrawing without academic penalty from "A" classes, first summer session.

June

Tuesday, 4: Last day for withdrawing from "A" classes, first summer session.

Monday, 10: Last day for withdrawing without academic penalty from "R" or "C" classes, first summer session. Last day for cancelling registration in "B" classes, first summer session.

Wednesday, 12: Intern training begins, Medicine.

Wednesday, 19: Last day for withdrawing without academic penalty from "B" classes, first summer session.

Tuesday, 25: Last day for withdrawing from "B," "R" or "C" classes, first summer session.
Summer School ends (first session).

Friday, 28: Last regular day for registration of postgraduate Medical Residents is June 28, 1985. Last day to apply for supplemental examinations in Law.

July

Monday, 1: Canada Day, Resident Training begins, Medicine. Postgraduate Medicine Residency programs commence.

Tuesday, 2: Level III fieldwork begins, School of Occupational Therapy. Summer School (second session) registration and classes begin.

Friday, 5: Last day for cancelling registration in "A" classes, second summer session.

Monday, 8: Last day for cancelling registration in "R" or "C" classes, second summer session.

Tuesday, 9: Supplemental and special examinations begin, Law.

Wednesday, 10: Last day to apply for supplemental examinations in Arts and Science, Health Professions and Management Studies. (does not apply to Graduate Studies) (to be written in August or September).

Monday, 15: Last day to apply for supplemental examinations in Dentistry and Dental Hygiene.

Tuesday, 16: Last day for withdrawing without academic penalty from "A" classes, second summer session.

Friday, 19: Supplemental and special examinations end, Law.

Tuesday, 23: Last day for withdrawing from "A" classes, second summer session.

Monday, 29: Fieldwork Level I begins, School of Occupational Therapy.
Last day for withdrawing without academic penalty from "R" or "C" classes, second summer session. Last day for cancelling registration in "B" classes, second summer session.

August

Thursday, 1: Last day for receipt of application for admission to Arts and Science for fall term.

Monday, 5: Halifax Natal Day and Dartmouth Natal Day — No Classes

Wednesday, 7: Supplemental examinations begin in Health Professions and Management Studies.

Thursday, 8: Last day for withdrawing without academic penalty from "B" classes, second summer session.

Friday, 9: Last day for those expecting Ph.D. degrees in October to submit unbound theses to departments.

Wednesday, 14: Last day for withdrawing for "B," "R," or "C" classes, second summer session.
Final day for classes, Summer School.

Thursday, 15: Supplemental examinations begin in Dentistry and Dental Hygiene.

Wednesday, 28: First year MBA orientation begins.

September

Monday, 2: Labour Day.

Tuesday, 3: Supplemental examinations begin, Arts and Science. Registration ends in: Law and Library Service.

Registration ends and Classes begin in: Medicine, School of Human Communication Disorders, MBA, Dentistry, Dental Hygiene, Outpost Nursing.

Wednesday, 4: Classes begin in: Library Service and Law.

Wednesday, 4 — Saturday noon, 7: Last regular days for class approval, registration, and payment of fees for students in: Arts and Science, Health Professions, Graduate Studies, Management Studies

Friday, 6: Last day for those expecting Masters degrees in October to submit unbound theses to departments.

Monday, 9: Classes begin in: Arts and Science, Health Professions Graduate Studies (unless otherwise specified), Management Studies.

Friday, 13: Last day for adding or changing a Fall or full-year class, Law.

Friday, 20: Last day for changing classes, School of Library Service. Last day for those expecting to receive a graduate degree in October to submit approved unbound copies of theses to Faculty of Graduate Studies Office.

Last day for adding classes (except "B" classes), Arts and Science, Health Professions and Management Studies.

Monday, 30: Last day for cancelling registration: Faculties of Arts and Science, Health Professions and Management Studies.

October

Friday, 4: Last day for withdrawing from "A," "R" or "C" classes without academic penalty, Management Studies.

Monday, 14: Thanksgiving Day.

Saturday, 19: Fall convocation.

November

Friday, 1: Last day for withdrawing from "A," "R" or "C" classes with a grade of "W," Management Studies.

Monday, 11: Remembrance Day.

Tuesday, 12: Last day for withdrawing from "A" classes without academic penalty, Arts and Science and Health Professions.

Friday, 15: Last day for receipt of application for admission to Arts and Science for winter term. Last day for those expecting PhD degree by approval of Senate in February to submit unbound theses to departments.

Monday, 18: Last day for withdrawing from "A" classes without academic penalty, Graduate Studies.

Friday, 29: Last day to change status (PT to FT or FT to PT), Graduate Studies.

December

Monday, 2: Last day to apply for intern training, Medicine.

Thursday, 5: Last day of classes in Arts and Science, Health Professions and Management Studies.

Friday, 6: Last day of classes, Law (all years).

Saturday, 7: Examinations begin in Law (second and third years).

Monday, 9: Examinations begin in Arts and Science, Health Professions and Management Studies.

Tuesday, 10: Examinations begin in Law (first year). Last day of classes, School of Library Service.

Wednesday, 11: Examinations begin, School of Library Service.

Friday, 13: Classes end, Dentistry (first, second and third years) and Dental Hygiene (first and second years). Last day for those expecting Masters degrees by approval of Senate in February to submit unbound theses to departments.

Monday, 16: Examinations begin, Dentistry (first, second and third years), Dental Hygiene (first and second years).

Wednesday, 18: Holidays begin.

Friday, 20: Last day of classes in Dentistry (fourth year)

Wednesday, 25: Christmas Day.

Thursday, 26: Boxing Day.

The last working day before December 31 is the deadline for submission of approved unbound copies of theses to the Faculty of Graduate Studies Office by those expecting to receive a graduate degree by approval of Senate in February.

January 1986

Wednesday, 1: New Year's Day.

Thursday, 2: Registration of new students (not applicable to Graduate Studies). Classes resume. Fieldwork (4th year) begins, School of Occupational Therapy.

Tuesday, 7: Last day for adding or changing spring term classes, Law.

Friday, 10: Last day for adding "B" (or second term) classes, Arts and Science, Health Professions and Management Studies.

Wednesday, 15: Last day for cancelling registration, those registered only in "B" classes.

Wednesday, 22: Last day for withdrawing from full-year classes, without academic penalty, Arts and Science and Health Professions.

Friday, 24: Last day for withdrawing from "B" classes without academic penalty, Management Studies. Last day for students in Arts and Science, Health Professions and Management Studies to apply for supplemental examinations "A" classes. (does not apply to Graduate Studies)

Friday, 31: Last day for withdrawing from full-year classes without academic penalty, Graduate Studies.

February

Saturday, 1: Winter Carnival, No classes.

Friday, 7: Munro Day, No classes.

Monday, 10: Supplemental examinations begin, Arts and Science and Management Studies.

Friday, 21: Last day, for withdrawing from B classes with a grade of "W," Management Studies.

Monday, 24: Study break begins.

Wednesday, 26: Last day for those expecting Ph.D. degrees in May to submit unbound theses to departments.

March

Monday, 3: Classes resume.

Friday, 7: Last day for withdrawing from "B" classes without academic penalty, Arts and Science, Health Professions and Graduate Studies.

Friday, 28: Good Friday.

Monday, 31: Last day for those expecting Masters degrees in May to submit unbound theses to departments.

April

Saturday, 5: Last day of classes in Arts and Science, Health Professions, (except 4th year Occupational Therapy) Management Studies and Graduate Studies.

Monday, 7: Examinations begin in Arts and Science, Health Professions, Graduate Studies and Management Studies.

Friday, 11: Last day for those expecting to receive a graduate degree in May to submit approved unbound copies of theses to Faculty of Graduate Studies Office. Last day of classes Law (all years), Library Service, Occupational Therapy (4th year).

Saturday, 12: Examinations begin, Library Service.

Friday, 18: Examinations begin, Law (second and third years) Last day of classes in Dentistry (third and fourth years), Dental Hygiene (first and second years).

Monday, 21: Summer clinical practicum begins in the School of Nursing (for basic degree students only), first, second and third year, 6 weeks, and School of Physiotherapy (second year). Summer clinical practicum begins, School of Physiotherapy (third year) (18 weeks). Examinations begin, Dentistry (third and fourth years), Dental Hygiene (first and second years).

Monday, 28: Third Term for Dentistry (third year) begins.

May

Senate meets to consider the award of degrees, Spring 1985. (dates to be confirmed).

Saturday, 3: Examinations end, Law.

Monday, 5: Level I fieldwork (second year, 4 weeks) and Level II fieldwork (third year, 8 weeks) begins, School of Occupational Therapy.

Thursday, 8: University Convocation, Management Studies, Health Professions and Graduate Studies.

Friday, 9: University Convocation, Arts and Science and Graduate Studies. End of year — Dentistry (fourth year).

Monday, 12: Summer School (first session) registration and classes begin.

Thursday, 15: Last day for cancelling first summer session registration in "A" classes.

Friday, 16: University Convocation (Medicine). Last day for cancelling first summer session registration in "C" or "R" classes.

Sunday, 18 - Tuesday, 20: Post-College Assembly, Dentistry.

Monday, 19: Victoria Day.

Tuesday, 20: Examinations begin, Dentistry (first and second years) and Dental Hygiene (first year).

Wednesday, 21: University Convocation (Dentistry and Graduate Studies).

Friday, 23: University Convocation (Law and Graduate Studies). Last day of classes, Dentistry (first and second years).

Monday, 26: Examinations begin, Dentistry (first and second years).

Tuesday, 27: Last day for withdrawing without academic penalty from "A" classes first summer session.

Friday, 30: End of year, Dental Hygiene (first year).

June

Tuesday, 3: Last day for withdrawing from "A" classes first summer session.

Monday, 9: Last day for withdrawing without academic penalty from "R" and "C" classes first summer session. Last day for cancelling registration in "B" classes first summer session.

Wednesday, 11: Internship year begins.

Wednesday, 18: Last day for withdrawing without academic penalty from "B" classes first summer session.

Tuesday, 24: Summer School ends (first session). Last day for withdrawing from "B," "R" or "C" classes first summer session.

Friday, 27: End of year Dentistry (third year).

Admission Application Dates

Arts and Science

Students entering from Canadian or US high schools	August 1
Foreign Students (except USA)	May 1
Transfer Students	July 1
BEd Program	May 30

Health Professions

(Undergraduate)	
Transfer Students ¹	July 1
Recreation, Physical and Health Education	July 15
Nursing — Basic BN	April 1
BN for Post RN ²	August 1
Outpost and Community Health Nursing ³	April 15
Occupational Therapy	March 1
Physiotherapy	January 28
Pharmacy	March 1
Social Work	April 15
(supporting documents)	May 15

Management Studies

(Undergraduate)	August 1
Transfer Students	July 1
Non-American Foreign Students	May 1
Public Administration	August 15

Dentistry

Dental Hygiene	December 1
	January 31

Medicine

MD	December 15
Post-Graduate	December 1

Law⁴

Graduate Studies

Non-North American Students	August 1
Human Communication Disorders	May 31
Law	February 28
Library Service	April 15
Nursing (full-time students)	April 15
Social Work	May 31
	January 31

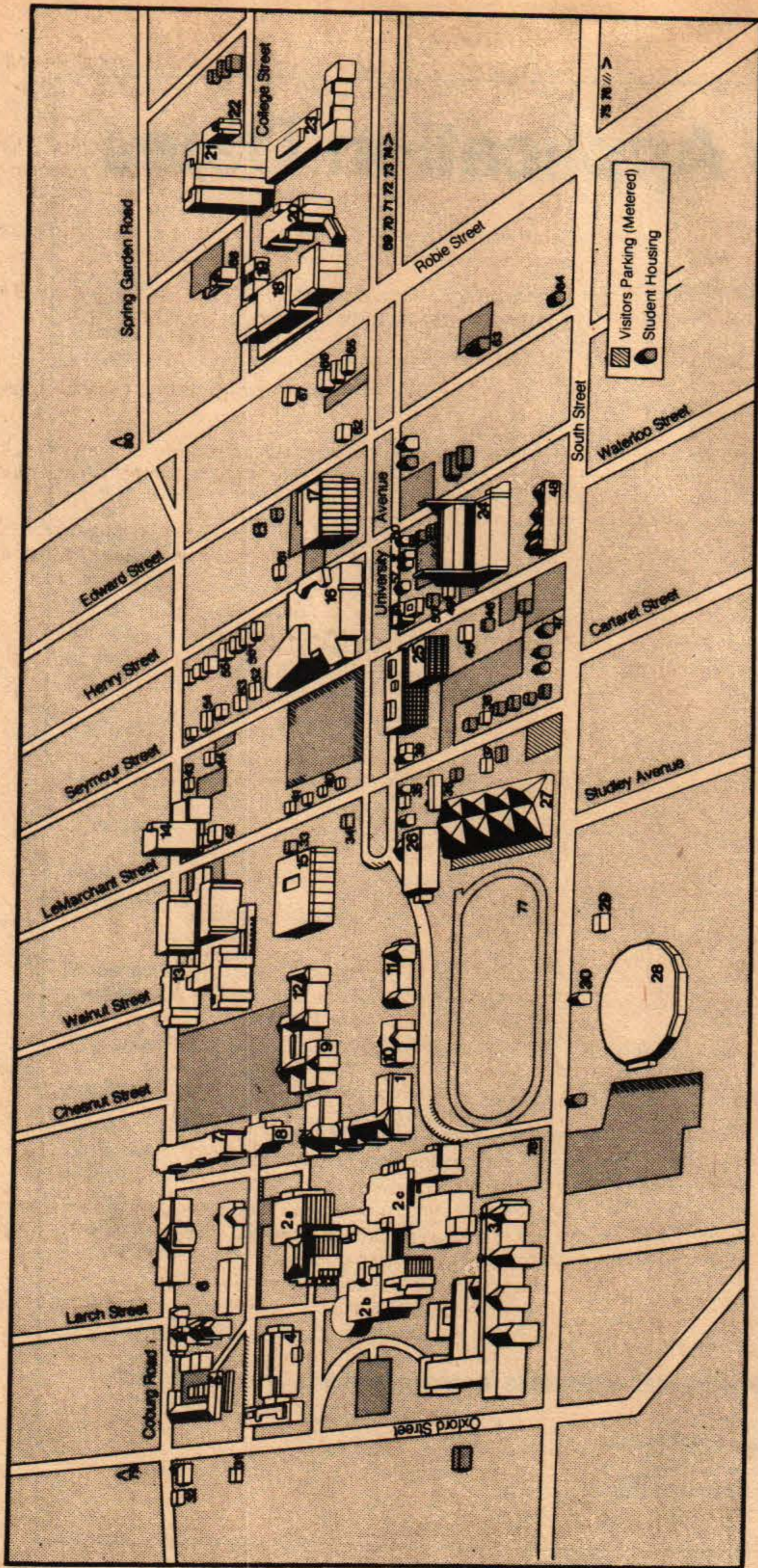
Winter Term

BA, BSc and BComm programs only	November 15
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Early Registration and Registration by Mail is Possible for Most Students, and is Advised

- ¹ Except Occupational Therapy, Pharmacy, Physiotherapy
² Subject to change depending on numbers applying
³ Application date for class entering in January is October 1.
⁴ Late applications may be considered.

The Campus Map



- Admissions - 1
- Alumni Office - 30
- Arts and Administration Building - 1
- Arts Centre - 16
- Biology - 2a
- Bookstore - 25
- Business Administration, School of - 14
- Chemistry - 9, 12
- Clinical Research Centre (CRC) - 23
- Computer Centre - 15
- Counselling and Psychological Services - 25
- Dalplex - 28
- Day Care - 5, 75
- Dentistry - 18
- Development Office - 8
- Dunn Building - 17
- Economics - 35
- Education - 11
- Engineering - 7
- English - 53 and 55
- Faculty Club - 10
- Forrest Building - 20
- French - 40
- Geology - 2b
- German - 4
- Graduate House - 39
- Health Education, School of - 29
- Henson Centre - 51
- History - 54
- Howe Hall - 13
- Institute of Public Affairs (IPA) - 51
- Killam Library - 15
- King's College - 6
- Law - 17
- Life Sciences Centre - 2
- Macdonald Science Library - 9
- MacMechan Auditorium - 15
- Mathematics - 15
- McInnes Room - 25
- Medicine - 21
- Nursing, School of - 22
- Occupational Therapy, School of - 21
- Oceanography - 2b
- Old Public Archives Building - 8
- Ombud's Office - 25
- Part-Time Studies and Extension - 57
- Pharmacy, College of - 19
- Philosophy - 56
- Physical Education, School of - 29
- Physics - 7
- Political Science - 1
- Psychology - 2c
- Public Relations - 8
- Rebecca Cohn Auditorium - 16
- Rink - 27
- Religion - 7
- Russian - 33
- Security and Traffic Office - 24
- Shirreff Hall - 3
- Social Work, School of - 32
- Sociology and Social Anthropology - 48
- Spanish - 33
- Student Union Building (SUB) - 25
- Studley Gymnasium - 26
- Theatre - 16
- Tupper Building - 21
- Visitors Parking (Metered)
- Student Housing

Dalhousie University

Dalhousie University is a non-denominational co-educational university. Founded in 1818, the University is a member of the Association of Universities and Colleges of Canada, the Atlantic Association of Universities, and the Association of Commonwealth Universities.

Dalhousie's student population has grown to 10,000 students. To accommodate these, in a wide variety of undergraduate, professional, and graduate programs offered, Dalhousie occupies more than 60 acres in a residential area of the city of Halifax. University facilities include buildings for teaching and research, libraries, residential housing for students, a Student Union Building, an Arts Centre for music, theatre, and an art gallery, and facilities for physical recreation. The Nova Scotia Archives building, the Atlantic Regional Laboratory of the National Research Council, major provincial hospitals, and the Dr. D.J. MacKenzie Laboratories are located in close proximity to the University. Dalhousie benefits from a variety of arrangements for teaching and research collaboration with hospitals and federal and provincial research laboratories.

The University of King's College, situated on the Dalhousie campus, is an affiliated institution, and its students in Arts and Sciences receive Dalhousie degrees authorized in the name of both institutions. By agreement with Mount Saint Vincent University there is co-operation in access for students to various courses and services, and by agreement with the Technical University of Nova Scotia there are co-operative arrangements for engineering, engineering-physics, and computer science studies. By arrangement with the Nova Scotia Teachers College, graduates of that institution may complete education degree requirements at Dalhousie. Co-operation in a number of academic programs, in administrative services, and in use of library resources is also provided for in working arrangements with Saint Mary's University and other institutions in Halifax.

Arrangements proposed with the Nova Scotia Agricultural College will provide for the awarding of degrees in Agriculture by Dalhousie in cooperation with the College.

Under the University's statutes the Board of Governors is responsible for the operation of the University. The Board consists of representatives named by the Government of Nova Scotia, by the alumni, by the Student Union and by certain other bodies. Internal regulation of the University is the primary concern of the Senate, subject to approval of the Board of Governors. The Senate consists of the President, Vice-Presidents, Deans of faculties and academic department heads, Registrar, full professors, other members of the academic staff elected from and by each faculty, six students elected by students, and certain other persons.

The President and Vice-Chancellor is the Chief Executive Officer of the University, responsible to the Board of Governors, for supervision of the University's administrative and academic work.

Subject to the general approval of the Senate, seven faculties are responsible for supervision of programs of study, of teaching and research, and for the recommendation of candidates for degrees, diplomas, and university prizes.

Faculties

Faculty of Arts and Science (the humanities, the physical, life and social sciences, some performing arts, education, introductory years in engineering);

Faculty of Health Professions (nursing, occupational therapy, pharmacy, recreation, physical and health education, physiotherapy, human communication disorders and social work);

Faculty of Management Studies (commerce and business administration, public administration, library service, health administration);

Faculty of Medicine (basic medical sciences, medicine, medical internship and clinical specializations, continuing medical education);

Faculty of Law (Law);

Faculty of Dentistry (dentistry, dental hygiene, and continuing dental education);

Faculty of Graduate Studies (advanced study in the humanities, the physical, life, social, and medical sciences, and a number of professions).

Coordination of continuing education programs both for degree credit and part-time studies and community education activities are being organized under the responsibilities of the Dean of Continuing Education.

Schools and Colleges

Business Administration
Dental Hygiene
Human Communication Disorders
Library Service
Maritime School of Social Work
Nursing
Occupational Therapy
Pharmacy
Physiotherapy
Public Administration
Recreation, Physical and Health Education

Institutes and Centres

Applied Microelectronics Institute
Atlantic Institute of Criminology
Atlantic Region Magnetic Resonance Centre
Atlantic Research Centre for Mental Retardation
Canadian Centre for Marine Transportation
Centre for African Studies
Centre for Foreign Policy Studies
Centre for International Business Studies
Centre for Marine Geology
Centre for Regional and International Development Projects
Centre for Research in Sensory, Psychology and Medical Physics
Dalhousie Ocean Studies Program
Institute for Resource and Environmental Studies
Institute of Oceanography
Institute of Public Affairs
Trace Analysis Research Centre

Academic Programs and Information Sources

In 1983-84 Dalhousie offered the following academic programs. The normal years of full-time study are shown. Information about each may be found in the current University calendar indicated.

Faculty of Arts and Science

Bachelor of Arts (Major 3 years, Honours 4 years)
 Bachelor of Science (Major 3 years, Honours 4 years)
 Diploma in Engineering (2 years)
 Bachelor of Education (Sequential) (1 year post BA, BSc)
 Bachelor of Education (Integrated) (4 years for BA or BSc with BEd)
 Bachelor of Music (4 years)
 Bachelor of Music Education (4 years)
 Certificate in Costume Studies (2 years)
 Diploma in Costume Studies (3 years)
 Diploma in Meteorology (1 year)
 Certificate in Educational Administration (minimum 1 year)

Faculty of Management Studies

Bachelor of Commerce (Major and Honours 4 years)
 Certificate in Public Administration (1 year)

Faculty of Health Professions

Bachelor of Physical Education (4 years)
 Bachelor of Recreation (4 years)
 Bachelor of Science in Health Education (4 years)
 Bachelor of Nursing (4 years, with previous RN 3 years)
 Diploma in Outpost and Community Health Nursing (15 months post RN)
 Bachelor of Science in Pharmacy (4 years)
 Residency Program in Clinical Pharmacy (1 year) (post BSc Pharm)
 Bachelor of Science in Physiotherapy (3 years Physiotherapy following one year of Arts and Science or minimum 2 years post Diploma program)
 Bachelor of Science in Occupational Therapy (3 years Occupational Therapy following one year of Arts and Science)
 Bachelor of Social Work (3 years Social Work study following one year general study, a wide choice permitted)

Faculty of Dentistry

Doctor of Dental Surgery (4 years)
 Postgraduate Certificate in Periodontics (2 years)
 Diploma in Dental Hygiene

Faculty of Law

Bachelor of Law (3 years)
 Bachelor of Laws with Master of Business Administration (4 years)

Faculty of Medicine

Doctor of Medicine (4 years)
 Intern Year (1 year)
 Residences (various programs ranging from 2-6 years post-intern)

Faculty of Graduate Studies

Master of Arts (1 or 2 years, with thesis) in Classics, Economics, Education, English, French, German, History, Mathematics, Philosophy, Political Science, Psychology, and Sociology
 Master of Science (1 or 2 years with thesis) in Anatomy, Biochemistry, Biology, Chemistry, Geology, Health Education, Human Communication Disorders, Audiology or Speech Pathology, Mathematics, Microbiology, Oceanography, Oral Surgery (4 years), Pathology, Pharmacology, Pharmacy, Physical Education, Physics, Physiology and Biophysics
 Doctor of Philosophy (2 or 3 years, with thesis) in Anatomy, Biochemistry, Biology, Chemistry, Classics, Economics, Education, English, Geology, His-

tory, Interdisciplinary Studies, Mathematics, Microbiology, Oceanography, Pharmacology, Pharmacy, Philosophy, Physics, Physiology, and Biophysics, Political Science, Psychology

Doctor in the Science of Law (2 or 3 years, with thesis)
 Master of Arts in Teaching (French) (2 years)
 Master of Business Administration (2 years)
 Master of Education (1 year)
 Master of Environmental Studies (1 or 2 years)
 Master of Laws (1 year)
 Master of Library Service (2 years)
 Master of Public Administration (2 years)
 Master of Development Economics (2 years)
 Master of Nursing (2 years)
 Master of Social Work (1 or 2 years)
 Diploma in Public Administration (1 year)
 Master of Business Administration with Bachelor of Laws (4 years)
 Master of Science in Oral Surgery (4 years)
 Doctor of Medicine (4 years)
 Intern Year (1 year)

Honourary Degrees

The degree of Doctor of Laws may be conferred *honoris causa tantum* upon approval of the Senate in recognition of significant contributions to society. All other degrees earned in course are approved by Senate.



General Information

Libraries

The Dalhousie University Library System is organized to accommodate the needs of the undergraduate teaching programs, graduate and faculty research projects, and professional schools. The system is made up of the following components: the University Library (Killam Library — Humanities, Social Science, and Mathematics; Macdonald Library — Sciences), the Sir James Dunn Law Library, and the Kellogg Health Sciences Library.

As of April 1, 1984, the total Dalhousie University Library System holdings include over 1,173,000 volumes of books, bound periodicals, documents, and bound reports, as well as 23,000 reels of microfilm, 275,000 microfiche and microcards, and 120,000 data cards, maps, musical scores, and other media. 12,000 serials titles are currently received, and dead title holdings number over 6,000.

The University Library alone has a collection of over 613,000 volumes of books and bound serials, as well as a periodical collection of more than 6,100 current subscriptions, and a government documents collection of over 275,000 items. In addition to the traditional printed materials, the library is developing its resources in forms such as records and microforms.

University Computing and Information Services

University Computing and Information Services (UCIS) is responsible for all centrally managed computing and communications facilities and services. These are available to faculty, staff and students for instructional, research and administrative purposes.

UCIS has three divisions. "Facilities and Operations" is responsible for the operation of central computers, hardware maintenance services, campus communications (including the telephone system) and central word processing and data entry services. "Academic Computing Services" provides consulting, education and documentation services related to the use of both large computers and personal computers. It is also responsible for support and maintenance of applications software for academic users. "Administrative Computing Services" is responsible for the selection, installation, development and maintenance of administrative computing systems, and for providing advice and education to users of administrative systems.

Currently, UCIS supports a Control Data Cyber 730 mainframe computer for general use, a couple of minicomputers for specific departments, plotters, public terminal laboratories and a microcomputer laboratory. A wide range of computer languages and applications software is available on the Cyber computer.

Student Services

Located in Room 124 of the Arts and Administration Building, this office provides a point of referral for any student problems. The Dean co-ordinates the administration of Awards, Chaplaincy, Counselling and Psychological Services, University Health, the *Writing Workshop*, the Ombud Office, and is the International Student Adviser. Through the Council of Student Life, the Dean acts as liaison with the Deans of Residences and the Student Union. Active participation exists among the various divisions and the officials of Housing, Recreation, and the Federal Manpower Office located on campus.

The Dean can assist students with any University related problem, and can offer direction in class or program selection to ensure compliance with the degree requirements of Dalhousie University. A special program has been developed for students requiring academic assistance. All divisions of

Student Services co-operate in the program together with a number of departmental faculty advisers. Students who may experience difficulties are encouraged to consult with the Dean who reviews their situation and advises them of the various services available.

Many students, particularly those in their first year, experience difficulty in organizing and presenting written work. In an attempt to respond to this problem, the University provides a *Writing Workshop*. Attendance is on a voluntary basis. For further information call 424-2404.

Non-Canadian students should look to this office for assistance in matters related to immigration status, medical insurance or any matter of special concern to visa students.

Dalhousie has a CUSO coordinator who may be reached through the Dean's office. General CUSO information is available to students at all times.

Student Counselling Service

The Student Counselling and Psychological Services Centre offers programs for personal development as well as assistance with personal, interpersonal and educational concerns. Counselling is offered by professionally trained counsellors and psychologists. Strict confidentiality is assured. Individual counselling is available for any personal or social problem which a student may encounter. Some of the programs offered regularly are: *Career Planning for Mature Students*; *Study Skills*; *Thesis Writing*; *Examination Anxiety Reduction*; "Speak Easy"; and the *Career Information Centre*.

Counselling Centre offices are on the 4th floor of the Student Union Building. Enquire or make appointments by coming in or calling 424-2081.

Chaplaincy at Dalhousie

The University provides facilities for chaplains appointed by various churches. There are four full-time chaplains at Dalhousie, representing the Anglican, Roman Catholic, Lutheran, and United Church traditions. In addition, contact ministers are designated by the Baptist, Jewish, and Presbyterian traditions and can be reached through the Chaplains' Office on campus. The Chaplains' Office is located on the third floor of the Student Union Building. Office hours are Monday to Friday 9-5. Appointments can be made for other convenient times. The chaplains are available at any time for emergencies. Outside office hours, chaplains may be reached by calling 422-5665, or via the SUB Enquiry Desk 424-2140.

University Health Service

The university operates an out-patient service, in Howe Hall, at Coburg Road and LeMarchant Street staffed by general practitioners and a psychiatrist. Further specialists' services are available in university hospitals and will be arranged through the Health Service when indicated. All information gained about a student by the Health Service is confidential and may not be released to anyone without signed permission by the student. In the event of emergency, students should telephone the University Health Service at 424-2171 or appear at the clinic in person. The university maintains health services on a 24-hour basis with a physician on call. The offices are closed from 10 p.m. to 9 a.m. All students must have medical and hospital coverage approved by the Health Service. All Nova Scotia students are covered by the Nova Scotia Medical Services Insurance. All other Canadian students must *maintain* coverage from their home provinces. This is especially important for residents of any province requiring payment of premiums. All non-Canadian students must be covered by medical and hospital insurance prior to registration. Details of suitable insurance may be obtained from the University Health Service prior to registration. Any student who has had a serious illness within the last 12 months, or who has any chronic medical condition, should contact and advise the Health Service, preferably with a statement from his doctor. Medications prescribed by any physicians or consultants are paid by a prepaid drug plan.

Student Housing

The University provides accommodation for more than 2,000 students in a variety of facilities — regular residence halls, apartments, graduate houses and casual houses.

Enquiries relating to residences, apartments and houses (with the exception of Peter Green Hall, as noted below) should be directed to the Dalhousie University Housing Office, Room 122, Student Union Building, Dalhousie University, Halifax, Nova Scotia, B3H 4J2.

In addition to coordinating applications for accommodation in University premises, the University Housing Office coordinates information on housing, apartments and other accommodations offered for rent by others in the Halifax-Dartmouth region. Information is posted on notice boards outside the Housing Office and phones are provided for use in calling prospective landlords. During summer months, a list of accommodations available is maintained and is sent periodically to out-of-town applicants upon request. Applicants from the Halifax area are expected to rely upon the notice boards at the office. The Housing Office will endeavour to help with special housing needs.

Residence Accommodation

The University provides accommodation for more than 2,000 students in a variety of facilities — regular residence halls, apartments and houses. Enquiries relating to residences, apartments, and houses (with the exception of Peter Green Hall, as noted below) should be directed as follows:

Residence Halls and Houses

Shirreff Hall (Women) — on campus, primarily undergraduate, accommodation and meals. Contact: Dean of Women, Shirreff Hall, Dalhousie University, Halifax, Nova Scotia, B3H 4J4.

Howe Hall (Men) — on campus, primarily undergraduate, accommodation and meals. Contact: Dean of Men, Howe Hall, Dalhousie University, Halifax, Nova Scotia, B3H 4J5.

Women's Residence Houses — within walking distance of campus, without meals. Contact: Dean of Women, Shirreff Hall, Dalhousie University, Halifax, Nova Scotia, B3H 4J4.

Apartments

Fenwick Place — a University-owned, co-ed high-rise apartment building with 2, 3 and 4-bed apartments with kitchen and living room, and laundry facilities on each floor. Contact: Manager, Fenwick Place, 5599 Fenwick Street, Halifax, Nova Scotia, B3H 1R2.

Peter Green Hall (Married students) — an apartment building available to married students only. Enquiries should be directed to the Business Office at 1094 Wellington Street, Halifax, Nova Scotia, B3H 2Z9.

Glengary Apartment (Women) — an apartment building close to the center of the University. Contact: Dean of Women, Shirreff Hall, Dalhousie University, Halifax, Nova Scotia, B3H 4J4.

Off-Campus Housing

The University Off-Campus Housing Office on the main floor of the Student Union Building on University Avenue co-ordinates information on housing, apartments and other non-university owned accommodation offered for rent in the Halifax-Dartmouth region. Information is posted on notice boards outside the Off-Campus Housing Office and a telephone is provided for use in calling prospective landlords. For further information on the Off-Campus Housing Office contact: The Manager, Off Campus Housing Office, Student Union Building, Dalhousie University, Halifax, Nova Scotia B3H 4J2.

Meals

Meal tickets may be obtained by any student for use in the residence dining rooms and meals are available at the Student Union Building Cafeteria.

Dalhousie Student Union

President, Student Union: Alex Gigeroff

Vice-President: Rusty James

Treasurer: Neil Ferguson

General Manager, Student Union: J.W. Graham, BComm

The Dalhousie Student Union is an incorporated body comprising all full-time students of Dalhousie University, and other students who have paid their union fees of \$83. The objects of the Union include acting as the official organization of the students of Dalhousie, and promoting activities for the advancement of its members. Government of all extra-curricular student activities is another Union responsibility.

Because of Dalhousie's diverse student population, the central Council has two tiers of student government. Matters of concern only within a particular faculty or degree program are usually dealt with by the relevant major society, while matters of general interest are under the direct control of the Students' Council. Council has given the major societies power to collect compulsory fees.

The Union regulates scores of student organizations, represents students throughout the University and, wherever possible, provides services to students as requested. Through the Union's efforts, students operate their own building, and the Union budget is now in excess of a million dollars.

The Union employs a staff to administer its affairs and to enable the Union to carry out its obligations. Supervision of the staff is generally entrusted to the General Manager, a full-time employee of the Student Union who is responsible to the President and to Council. His job is largely administrative, but he is often called on for information and advice by the Council or other Union organizations. About eight full-time employees provide continuity and expertise. The Union uses its need for employees as a source of part-time work for students.

Every student has the opportunity to take advantage of the Union's financial, physical and organizational resources. To use that opportunity you should know who represents you on Council and who are the members of the Executive. The Student Council office is located on the second floor of the SUB and is open from 8:30 a.m. to 5:00 p.m. Monday through Friday. Council members have mail boxes located in that office. Union Executive officers also have offices in the SUB. Their office hours are usually posted, or messages can be left for them in Room 222 or at the Enquiry Desk.

Student Clubs and Organizations

Extracurricular activities and organizations at Dalhousie are as varied as the students who take part in them.

Organizations range from small informal groups to large well organized ones; they can be residence-based, within faculties, or university-wide.

Some are decades old with long traditions, others arise and disappear as students' interests change.

The Student Handbook publishes a list of clubs, societies and organizations, and every fall new students are encouraged to select and participate.

Cultural Activities

The region's major art gallery and the performing arts centre on the Dalhousie campus are active places indeed. The Dalhousie Art Gallery and the Rebecca Cohn Auditorium attract major exhibitions and regional, national, and international entertainment.

Dalhousie theatre productions and the Dal music department offer outstanding opportunities for student expression and performance.

Athletics

Dal's main building for athletics and recreation is recognized as a superb international-class sport facility. "Dalplex" sports programs welcomes students of all skill levels.

The Divisions of Athletics and Recreation offers a well-diversified program for every student at Dalhousie University. For those interested in highly

competitive sports, there is a broad selection of inter-collegiate activities. For those who enjoy competition and friendly rivalry there is an interfaculty athletic program. For those interested in recreational activities on a casual or club basis opportunities exist.

Dalhousie is a major participant in regional varsity sports through the Association of Atlantic Universities and the Canadian Intercollegiate Athletic Union.

Alumni Association

The Alumni Association is composed of over 30,000 former students of the University. It operates a number of programs, including a young alumni club and branch clubs outside Halifax, and a counselling and tutoring service. The association also publishes the *Dalhousie Alumni Magazine* which is sent to all Alumni and friends of the University. The association sponsors class reunions, scholarships and bursaries, the Alumni Award for Teaching Excellence, assists with fund-raising drives and arranges for alumni representation on the Board of Governors.

Canadian Armed Forces

The Regular Officer Training Plan (ROTP), Medical Officer Training Plan (MOTP) and the Dental Officer Training Plan (DOTP) are completely subsidized university plans covering tuition, books, medical services, monthly pay and summer employment for up to four years of undergraduate study. Successful applicants serve as commissioned officers in the Canadian Armed Forces for varying compulsory periods after graduation.

For further information on above plans, contact a Canadian Forces recruiting centre.

Awards Office

Director: G.G. Steedman, BA

The awards office offers information and assistance with respect to Dalhousie Scholarships, Bursaries and Prizes, the Canada Student Loan Program, Provincial Loan and Bursary Programs, and Dalhousie Loan Funds. Students with financial problems are encouraged to ask for advice at our office. Further information may be obtained from the Awards Office, Room 125 Arts & Administration Building. A booklet, Scholarships, Prizes and Financial Aid, is available from the office.



University Regulations

1. All students must report their local address while attending the University to the Office of the Registrar, on registration or as soon as possible thereafter. Subsequent changes must be reported promptly.
2. Place of Residence of Students. For the purpose of admission to the University, the place of residence of a student is the place of domicile. This is normally presumed to be the place (country, province, etc.) where the parents' or guardian's home is located. That place remains unchanged unless the Registrar is satisfied that a place of residence is established elsewhere.
3. No person under sixteen years of age is admitted to any class except by special permission of the Senate.
4. All students must agree to obey all the regulations of the University already made or to be made, and pay the required fees and deposits before entering any class or taking any examinations.
5. A student is not eligible to register unless all previous accounts, including fees, library fines, and other fines to the University have been paid.
6. Late Registration requires the approval of the Dean of the Faculty.
7. Withdrawal: See the individual faculty regulations and the Fee section.
8. Tuberculin Test: In the interests of public health in the University, students are encouraged to have a tuberculin test. This is compulsory for Dental, Dental Hygiene and Physiotherapy students. Facilities for testing are arranged by the University Health Services.
9. Transcript of Record: A student may receive only an unofficial transcript. Official transcripts will be sent at a student's request to other universities, or to business organizations, etc. on payment of the required fee. If a student so requests, a copy of a medical certificate will be enclosed with the transcripts.
10. The Senate is charged with the internal regulations of the University, including all matters relating to academic affairs and discipline, subject to the approval of the Governors. Within the general policies approved by Senate, academic requirements are administered by the Faculty concerned.
11. When the work of a student becomes unsatisfactory, or a student's attendance is irregular without sufficient reason, the Faculty concerned may require withdrawal from one or more classes, or withdrawal from the Faculty.
12. If a student is required to withdraw from a Faculty because of failure to maintain adequate academic standing, such a student may apply to another Faculty. However, in assessing the application, previous performance may be taken into consideration.
13. Members of the University, both students and staff, are expected to comply with the general laws of the community, within the University as well as outside it.

14. Alleged breaches of discipline relating to student activities under the supervision of the Dalhousie Student Union are dealt with by the Student Union. Alleged breaches of discipline relating to life in the residences are dealt with by the appropriate Dean or Director of Residence in consultation with the relevant Residence Council. Senate is charged with the authority to deal with cases of alleged academic offences as well as certain other offences, and delegates this authority to the Senate Discipline Committee.

15. On report of a serious breach of the law, or a serious academic offence deemed by the President, or in his absence by the Vice-President or the Dean of a Faculty, to affect vital University interests, a student involved may be temporarily suspended and denied admission to classes or to the University by the President, Vice-President or Dean, but any suspension shall be reported to the Senate, together with the reasons for it, without delay.

16. No refund of fees will be made to any student required to lose credit for any course taken, required to withdraw or who is suspended or dismissed from any class or any Faculty of the University.

17. Plagiarism is considered a serious academic offence which could lead to loss of credit and suspension from the University. Plagiarism may be defined as the presentation by an author of the work of another author, in such a way as to give one's reader reason to think that the other author's work is one's own. A student who is in any doubt as to what constitutes plagiarism is urged to discuss the matter with the instructor concerned *before* completing an assignment.

18. Academic Offences are dealt with by the Senate Discipline Committee, which consists of five members, three of which are members of the Senate, and two of which are students.

The terms of reference under which the Committee operates are as follows:

Procedures for Dealing With Academic Offences

(a) The Senate Discipline Committee is vested with original jurisdiction to consider all complaints or allegations respecting offences or irregularities of an academic nature, including those relating to admissions procedures and evaluation procedures, and to impose penalties in cases where the Committee finds an offence or irregularity has occurred.

(b) The Senate Discipline Committee shall assume jurisdiction when a complaint or allegation respecting offences or irregularities of an academic nature are brought to its attention by the Secretary of Senate.

(c) The Senate Discipline Committee shall report its findings and any penalty imposed to the Secretary of Senate. The Secretary of Senate shall forward a copy of the report to any member of the University community whom the Senate Discipline Committee has found to have committed an offence or irregularity and if the member concerned be other than a student a copy shall also be sent to the Vice-President (Academic).

(d) If the member of the University found to have committed an offence or irregularity is a student, he may appeal to Senate on any finding or any penalty imposed by the Senate Discipline Committee by advising the Secretary of Senate in writing within 30 days of receipt of the report by the student.

Irregularities in Admissions Procedures

A member of the University who gains admission or assists any other person in gaining admission by any irregular procedure, for example, by falsifying an academic record or by forging a letter of recommendation or by impersonating any other person, commits an academic offence and is liable to a penalty.

Irregularities in Evaluation Procedures

(a) A member of the University who attempts or who assists any other person in an attempt to obtain, by irregular procedures, academic standing in a course related to any degree, diploma or certificate program, commits an academic offence and is liable to a penalty.

(b) Without limiting possible irregularities in evaluation procedures that may be considered by the Senate Discipline Committee, the following examples shall be considered irregular procedures.

- (i) arranging for or availing oneself of the results of any personation at any examination or test, or,
- (ii) attempting to secure or accepting assistance from any other person at any examination or test, or,
- (iii) having in one's possession or using any unauthorized material during the time that one is writing any examination or test, or,
- (iv) without authorization procuring a copy of an examination, test or topic for an essay or paper, or,
- (v) in the absence of any enabling statement by the Faculty member in charge of that course, submitting any thesis, essay, or paper for academic credit when one is not the sole author, or,
- (vi) without authorization submitting any thesis, essay or term paper that has been accepted in one course for academic credit in any other course in any degree, diploma or certificate program.

Penalties

The Senate Discipline Committee, when it finds that a member of the University who is a student has committed an academic offence or irregularity may impose one or more of the following penalties:

- (a) loss of all credit for any academic work done during the year in which the offence occurred;
- (b) suspension of rights to attend the University for a specified period;
- (c) dismissal from the University;
- (d) such lesser penalty as the Committee deems appropriate where mitigating circumstances exist.

Definitions

Full-time Students: those registered for three full classes or more, or the equivalent of three half credit classes or more in either first or second term.

Graduate Students: students who are enrolled in the Faculty of Graduate Studies.

Matriculation Standing: Senior Matriculation designates the level of studies attained by students who have successfully completed Grade XII in a public high school in Nova Scotia or its equivalent elsewhere.

No-degree Students: students who are not candidates for a degree or diploma but who wish to take one or more university classes which may be allowed for credit. This is not the same as auditing a class (see General Undergraduate Regulation 16). No-degree students must satisfy normal admission requirements.

Part-time Students: students registered for fewer than three full-credit classes or the equivalent of three half-credit classes in either first term or second term.

A full credit class is equivalent to 6 credit hours.

Undergraduates: students who are candidates for an undergraduate qualification.



Fees

Full-Time Students

For fee purposes, full-time *undergraduate* students are those registered for fall and winter terms for more than three full-credits, or if registered for only one term, for more than three one-half credits. (For other purposes, there is another definition.) Students other than *graduate* students may be registered full-time in one term and part-time in the other.

Fees 1984-85

The 1985-86 fee schedule was not available at the time of printing this calendar. It will be available from the Student Accounts Office by June/85.

Fees are due and payable at registration but if preferred, those registered full-time for fall and winter terms may pay in two installments, the first due by September 30, 1985, the second by January 25, 1986.

Students whose accounts are more than 30 days in arrears are considered financially dismissed from the University.

To be reinstated the student must pay the arrears in full, the interest on the arrears and a \$50.00 Reinstatement fee.

Please note the fee reduction if paid in full before August 31, 1985.

Foreign Students

Students registering at Dalhousie who are not Canadian citizens or permanent residents are required to pay an additional fee of \$1375.00 if registered on a full-time basis, or if registered part-time, a proportionate fee related to their part-time studies. (Any assessed differential must be paid in full with the first installment, and is payable each session the student attends as a visa student).

Membership at Dalplex is included in the University fee for all Full Time students at Dalhousie and all Part Time students at Dalhousie taking three full credit courses. Membership in Dalplex for ALL other part time students at Dalhousie may be obtained at the office of Dalplex at prevailing rates.

Audit Students

Full time students may audit classes (where this is permitted), which are related to their programs without additional fees. Part-time students who wish to audit classes are required to register and pay fees at registration on the following basis:

One-half credit class	\$75.00
One full credit class	\$150.00

A student registered to audit a class who during the session wishes to change to registration for credit must receive approval from the Registrar and pay the difference in class fees plus a transfer fee of \$25.00. This must be done before the last date for class changes as given in the Almanac. The same deadline applies for a change from credit to audit.

Summer Session Students

Students registered for the first or second summer session must pay fees on the specified registration dates, otherwise a late registration fee must also be paid. For full information, see the Summer School Calendar, available from the Director of the Summer School.

Regulations for Payment of Fees

Fees must be paid in Canadian funds by cash or negotiable cheque. If payment is by cheque and returned by the bank as non-negotiable, the account will be considered unpaid and there will be an additional fee of

\$15.00. If the cheque was to cover the first payment on tuition, the student will not be considered registered and, if applicable, the late fee for registration will apply.

Application Fee

An application fee of \$15.00 is required with the application form submitted by any student for any program except one in which the applicant has been previously enrolled. If the fee is paid for a given session, and the applicant does not attend, whether accepted or not accepted, and an application is made for a subsequent session, the fee is again payable. Application fees are not refundable and are not applied as a credit to class fees.

Admission Deposit

A deposit of \$100.00 is required by all new students (except in Law, where the required deposit is \$200.00) within three weeks of receipt of an offer of a place at Dalhousie. In some programs there is a partial refund for students who notify the Registrar's Office in writing of cancellation of their application by August 1. There is no refund for limited enrolment programs. Where fees in full are payable by a government or other agency, any deposit paid by an individual will be refunded to the student by November 15, unless the account is not paid by November 1. In this case the refund will be made as soon as payment is received.

Registration Fees

All students are expected to register on or before the specified dates. To complete registration a student is required to complete the registration process, including any necessary class selection or approval, and to pay a minimum fee of \$50.00 unless a deposit of at least this amount has been made. This payment must be made by all students including those on scholarships, fellowships, student loans, or whose fees are to be paid by external agencies, and *commits* the student to the payment of the balance of fees unless formal action to withdraw is taken *in writing* at the Registrar's office.

Late Registration

Students are expected to register on or before the specified dates as indicated in the almanac. Late registration requires the approval of the Dean of the Faculty and, if this is granted, payment of an additional fee of \$25.00 on or before September 30 and \$100.00 after September 30, (January 30 for January registration), and the entire first installment. Similar dates apply in summer sessions.

Additional Information About Payment of Fees

Bills for fees will not be issued. The receipt issued at registration will show the balance outstanding.

Students planning to pay the first installment of fees from a Canada Student Loan should apply to their Province as early as possible so that funds will be available at registration.

Scholarships or bursaries paid by or through Dalhousie University will be applied to fees. Students must produce at registration adequate documentary evidence of entitlement to the sums claimed under the award. If fees are to be paid by a government or other agency, a signed statement from the agency must be presented at registration. (All such students are required to pay the appropriate deposit on registration.)

Fees cannot be deducted from salaries paid to students who are employed by Dalhousie University.

Delinquent Accounts

Compound interest will be charged on any balance of fees outstanding after the registration date except where payment of a second installment is permitted. When fees are paid within two weeks of the last date for regular registration, interest charges will be foregone. Students whose accounts are more than 30 days in arrears are considered financially dismissed from the

Fees 1984-85

	University Fee	Student Union Fee ¹	Society Fee	TOTAL	If paid by TWO installments		
					If paid before Aug. 31, 1984 pay only	At Registration	Balance Jan. 25/85
Arts & Science	1,410.00	83.00	5.00	1,498.00	1,470.00	975.00	523.00
King's (payable to Dalhousie)	1,410.00	—	5.00	1,415.00	1,387.00	975.00	440.00
Engineering	1,490.00	83.00	10.00	1,583.00	1,553.00	975.00	608.00
Health Professions							
Nursing	1,490.00	83.00	15.00	1,588.00	1,558.00	975.00	613.00
Outpost nursing, 2nd year	1,490.00	—	15.00	1,505.00	1,475.00	975.00	530.00
Pharmacy	1,490.00	83.00	28.50	1,601.50	1,571.50	975.00	626.50
Clinical Residence — Pharmacy	360.00	—	—	360.00	360.00	360.00	—
Phys. Ed., Health Ed., Rec.	1,490.00	83.00	10.00	1,583.00	1,553.00	975.00	608.00
Physio./Occ. Therapy	1,490.00	83.00	12.00	1,585.00	1,555.00	975.00	610.00
Administrative Studies							
BComm	1,490.00	83.00	30.00	1,603.00	1,573.00	975.00	628.00
CPA, BSW	1,410.00	83.00	10.00	1,503.00	1,475.00	975.00	528.00
Graduate Studies							
Full time	1,510.00	83.00	20.00	1,613.00	1,583.00	1,100.00	513.00
Part-time for Degree	520.00	34.00	10.00	564.00	554.00	375.00	189.00
Thesis-only full-time	235.00	83.00	20.00	338.00	338.00	338.00	—
Thesis-only part-time	235.00	41.50	10.00	286.50	286.50	286.50	—
MSc Dentistry — Oral Surgery	1,755.00	83.00	20.00	1,858.00	1,823.00	1,100.00	758.00
LLM (full-time) JSD	1,615.00	83.00	20.00	1,718.00	1,686.00	1,100.00	618.00
LLM (part-time for Degree)	807.50	41.50	10.00	859.00	843.00	576.00	283.00
Law	1,615.00	83.00	15.00	1,713.00	1,681.00	1,100.00	713.00
Medicine							
MD	1,755.00	83.00	18.00	1,856.00	1,821.00	1,100.00	756.00
Postgraduate, Interns, Residents	360.00	—	—	360.00	360.00	360.00	—
Dentistry							
DDS ²	1,755.00	83.00	150.00	1,988.00	1,953.00	1,100.00	888.00
DDS Advanced Standing ²	3,510.00	83.00	150.00	3,743.00	3,673.00	2,200.00	1,543.00
Dental Hygiene ²	1,490.00	83.00	5.50	1,578.50	1,548.50	975.00	603.50
Dental Hygiene Advanced Standing ²	2,980.00	83.00	5.50	3,068.50	3,008.50	1,950.00	1,118.50
Postgraduate Periodontics	1,755.00	83.00	150.00	1,988.00	1,953.00	1,100.00	888.00
Full-time: one term only more than 3 one-half credits	700.00	41.50	—	741.50	741.50	741.50	—
Part-time: session and term³							
1 Full-credit Course	300.00	17.00	—	317.00	311.00	200.00	117.00
2 Full-credit Courses	580.00	34.00	—	614.00	602.00	400.00	214.00
3 Full-credit Courses ⁴	860.00	83.00	4	943.00	926.00	600.00	343.00
½-credit Course	150.00	8.50	—	158.50	158.50	158.50	—
⅓-credit Course	100.00	8.50	—	108.50	108.50	108.50	—
Audit: session and term⁵							
1 Full Audit Course	150.00	—	—	150.00	150.00	150.00	—
½ Course for Audit	75.00	—	—	75.00	75.00	75.00	—
⅓ Course for Audit	50.00	—	—	50.00	50.00	50.00	—

¹ Charges include Year Book in graduating year.

² An instrument user fee will be charged in addition to total fee. Candidates with advanced standing admitted to special programs in DDS and Dental Hygiene to meet Provincial Professional Qualifications are required to pay double the University fee paid by students in regular programs.

³ Registered for a total of three (3) credits, or less, for session; if three one-half credits, or less for term.

⁴ Society Fee for the appropriate faculty is an additional charge. (+)

⁵ Course *not* for credit, for interest only. If during session a change from audit to credit is desired, an additional charge of \$25.00 plus the difference in fee for credit course is charged.

Membership at Dalplex is included in the University fee for all full-time students at Dalhousie and all part-time students at Dalhousie taking Three full-credit courses. Membership at Dalplex for *all* other part-time students at Dalhousie may be obtained at the office of Dalplex at prevailing rates.

University. The student will be reinstated upon payment of the arrears, the arrears interest and a \$50.00 Reinstatement fee.

Fees Deductible For Income Tax

The amount of fees constituting an income tax exemption for the student is calculated by deducting from the total charge; (1) the portion of the Student Union Fee for operating expenses of the Union as applicable, and (2) the Society Fee. Fees may be claimed as a deduction only by the student. A special certificate for income tax purposes will be issued on request to the Student Accounts Office in February of each year.

Refund of Fees

No refund is made for 30 days when payment is made by personal cheque. In any program in which the registration is limited, the first installment of fees is not refundable except on compassionate grounds (e.g. illness). In other programs refunds may be made under certain conditions set out below. No refunds or rebates of charges for the session will be made to students withdrawing after the end of January.

NON-ATTENDANCE AT CLASSES DOES NOT CONSTITUTE WITHDRAWAL.

A student who has registered and wishes to withdraw must complete the necessary formalities through the Registrar's office in writing before becoming entitled to any refund or exemption from unpaid fees. Retroactive withdrawals are not permitted.

A student who has paid an admission deposit and *Cancels* that application before *August 1*, may be entitled to a refund of 75%, depending on the program. The programs for which refunds are given are in Arts and Science and Management Studies.

A student *withdrawing* within two weeks of commencement of classes will be charged a registration fee of only \$25.00.

A student withdrawing after two weeks of the date of commencement of classes will be charged the incidental fees in full and may receive a refund (or be exempt from unpaid fees as the case may be) of the balance on a proportional basis, calculated in monthly units; a full charge will be made for the month in which the withdrawal is effective, including the month of December.

A student withdrawing in January will be charged the full first installment of fees.

A student changing before February 1 from full-time to part-time status, with the approval of the Registrar, will be eligible for an adjustment in fees for the remainder of the session.

A student registered for the fall term only who withdraws in September will be charged a registration fee of only \$25.00. For withdrawal on any date in the month of October the charge is one-third of the university fee (plus Incidental Fee in full, where applicable). The Full fee is charged if a student withdraws after October 31.

A student registered for the winter term only, who withdraws up to January 15 will be charged a registration fee of only \$25.00. From January 15 to February 15 the charge is one-third of the university fee (plus Incidental Fee if applicable). The Full fee is charged if a student withdraws after February 15.

A student who is dismissed from the University for any reason will not be entitled to a refund of fees.

Application for a refund or adjustment should be made to the Student Accounts Office after the approval of the Registrar has been obtained.

Other Charges

Identification Cards

All new, full and part-time students may obtain identification cards upon registration and payment of proper fees. ID cards for those who register early for the regular academic year are issued by the ID Office (located in

the central foyer of the Arts and Administration Building basement) starting on the first weekday in June. For either summer school session, ID cards are issued starting 2 weeks prior to the commencement of classes. An ID card will only be issued upon presentation of the appropriate requisition form, authorized by both the Registrar's Office and the Student Accounts Office. If a card is lost, authorization for a replacement may be obtained from the Office of the Registrar. A fee of \$12.00 is charged for all replacement ID cards except those expressly directed by the University. Regular academic year ID cards remain valid until the beginning of the following academic year (including summer session. ID cards issued specifically for a summer session expire at the conclusion of that session). At the commencement of subsequent consecutive years, validation stickers are affixed to the "expired" ID card. Should ID cards not be available for validation, a new one will be issued and the student charged for the replacement (currently \$12.00). A student who also becomes an employee of Dalhousie University will have a sticker showing the employee number, placed on the student ID card. Similarly, a Dalhousie University employee may have a sticker showing the student number placed on the employee ID card when becoming a student.

Laboratory Charge

No laboratory deposit is required. Students will be charged for careless or willful damage.

Fees for Supplemental and Special Examinations

For supplemental and special examinations the fee is \$25.00 per examination. There is an additional fee of \$25.00 if an examination is written at an outside centre. The fee will be forfeited unless application for refund is made on or before July 31, or in the case of February supplemental examination, January 31.

The fee for reassessment of a class grade (where this is permitted) is \$3.00.

Degree in Absentia

Any graduating student who is unable to appear at the convocation is expected to notify the Registrar in writing prior to May 4, or October 15 for Fall convocation, giving the address to which the diploma is to be mailed. In any case where notification is not received by the required date, and a student does not appear at the convocation, there will be a fee of \$20.00.

Transcripts

Transcripts, official or unofficial, will be issued only on the request of the student concerned. Official transcripts will be sent only to other universities, prospective employers, etc. The charge is \$3.00 for the first copy, \$0.50 for each additional copy ordered at the same time for the same address. Transcripts will not be issued if any account with the university is delinquent.

Residence Charges

Applications for accommodation in all residences are accepted on the understanding that the student will remain for the whole academic session.

When students, who have chosen to live in residence and succeeded in securing a room, withdraw from residence before the end of the school year, there are serious financial penalties. One month's written notice must be given to the Dean or Manager. Complete information on withdrawal from residence are available from the residence Dean. No refund will be made to any resident who is dismissed for misconduct. Discretionary power in exceptional circumstances remains with the Manager of University Services. Confirmation of accommodation will not be granted until the student has been accepted by the University for the coming session and the \$100.00 residence deposit has been received from the student by the Dean before August 1.

Deposits may be made by cheque, bank draft or money order in Canadian funds and payable to Dalhousie University. No reservations will be held on post-dated or "NSF" cheques. Deposits cannot be deducted from scholarships, fellowships or similar awards.

Residence Fees and Meal Charges

Period September 6, 1985, to the day in April after the last examination in the Faculty of Arts and Science (exclusive of Christmas vacation)

SUBJECT TO CHANGE

	Total	Prepaid Deposit	In Full At Reg.	Payable At. Reg.	Balance Jan. 25 ⁸
Howe Hall¹					
Single Room & Board	\$3,192.00	\$100.00	\$3,092.00	\$1,600.00	\$1,502.00
Double Room & Board	2,927.00	100.00	2,827.00	1,600.00	1,237.00
Shirreff Hall²					
Single Room & Board	3,160.00	100.00	3,060.00	1,600.00	1,470.00
Double Room & Board	2,982.00	100.00	2,882.00	1,600.00	1,292.00
Ardmore Hall³					
Single Room	1,660.00	100.00	1,560.00	850.00	720.00
Double Room	1,463.00	100.00	1,363.00	850.00	523.00
Residence Houses⁴					
Single Room	1,826.00	100.00	1,726.00	900.00	836.00
Double Room	1,588.00	100.00	1,488.00	900.00	598.00
Glengary Apartments⁵					
Single Room	1,890.00	100.00	1,790.00	900.00	900.00
Double Room	1,650.00	100.00	1,550.00	900.00	650.00
Bachelor Apartment	2,569.00	100.00	2,469.00	1,250.00	1,229.00
Fenwick Place^{6,7}					
Student shared rates:					
2 person	2,240.00	100.00	2,240.00	1,120.00	1,120.00
3 person	1,760.00	100.00	1,760.00	880.00	880.00
4 person	1,824.00	100.00	1,824.00	912.00	912.00
Meals Only					
Special rate for session:					
3 meals per day	1,365.00				
2 meals per day	1,315.00				

¹ Charges include residence membership fee of \$25.00 and key deposit of \$6.00

² Charges include residence membership fee of \$15.00 and key desposit of \$2.00

³ Charges include residence membership fee of \$10.00 and key deposit of \$2.00

⁴ Charges include key deposit of \$2.00

⁵ Charges include caution deposit of \$50.00

⁶ The \$100 prepaid deposit is a damage deposit — see application for details

⁷ The \$10.00 Service Charge is not applicable

⁸ Charges include service charge of \$10.00

Payment of Residence Charges

Payment may be made in full at registration or, for an extra charge of \$10.00, in two installments as per rate schedule. Scholarships may be applied to residence charges only after tuition fees for the full session are paid. The first installment must be paid in full by the date of registration. A penalty is imposed for late payment, of \$5.00 per day, to a maximum of \$100.00, commencing on the first business day following registration. To all accounts outstanding after September 30 an interest of 1.33% per month (16% per annum) will be charged. On second installments outstanding after February 1 interest of 1.33% per month (16% per annum) will be charged. The interest rate may change from time to time without notice if the cost of money to the University varies. The student will not be permitted to register for another session until all accounts are paid in full. Students whose accounts are in arrears more than 30 days are considered financially dismissed from the University.

Key and Caution Deposits

Key and caution deposits may be charged before admission to residence.

The key deposit is refundable when the keys are returned to the Dean or Manager. The credit balance of the caution deposit will be refunded as soon as possible after the end of the academic session.

Regulations and Additional Charges

The complete session is defined as being from the Wednesday before classes begin in the Arts and Science Faculty to the last regularly scheduled examinations in the Faculty of Arts and Science.

No reduction in board charge can be made for meals not taken, except that a rebate of \$20.00 per week may be considered in case of illness or other cause necessitating absence of four weeks or more.

Residence students may apply to the Dean or Manager for permission to stay in residence over the Christmas holidays, if they are unable to return home due to the distance involved.

In all other cases, an additional fee is payable to all residents who are registered in a Faculty where the academic session commences before or continues after the session of the Faculty of Arts and Science. Special arrangements are to be made with the Dean or Manager by residence students for accommodation for periods prior to or following the session as defined above. The charge for such accommodation is as follows:

Residence students before or after current session, all residences
 Room per night: \$13.00
 Room per week: \$55.00

Non-residence students may be accommodated for temporary periods at the same rates, if accommodation is available.



Faculty of Arts and Science

Introduction

The Faculty of Arts and Science consists of several groups of persons: some four thousand undergraduate students who typically spend three or four years in the faculty, over three hundred teaching and research faculty members most of whose positions are more or less permanent as well as a number of part-time teachers, and a third important element consisting of the support staff of secretaries, technicians, etc. Academically, the student's almost exclusive role is to learn — from teachers, from laboratory experience, from books and from solitary contemplation. Students learn not only facts but concepts, and most important, learn how to learn. Almost all of what undergraduate students learn of fact, concepts and methods, although new to them, is not new to the world.

The academic faculty have two equally important roles: to teach the same facts, concepts and methods that the student must learn; and to contribute to human knowledge through research, scholarly or artistic activities.

During the students' years of undergraduate study, through intellectual interaction with other members of the academic community, they should gain the background knowledge, the ability and the appetite for independent discovery. This point is marked formally by the award of a Bachelor's degree.

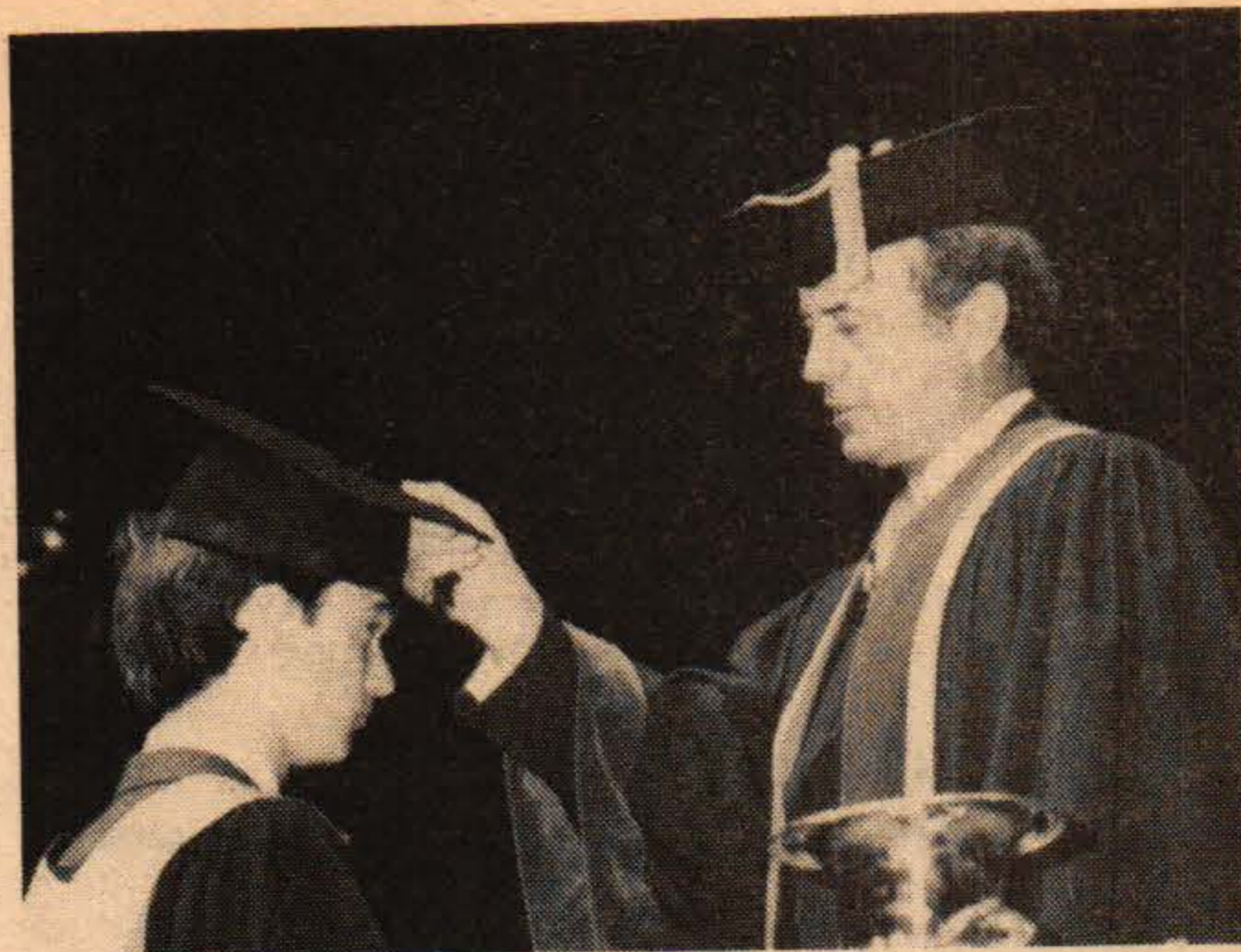
The Faculty of Arts and Science at Dalhousie is divided into twenty-five departments representing at least that number of intellectual disciplines. Most of the departments are devoted either to the liberal arts or the pure sciences. In addition, at Dalhousie this Faculty contains a second group of quasi-professional departments including Music, Theatre, Education and Engineering. An important role of these professional departments is to prepare students for employment in the corresponding profession.

Much less well understood is the role of the liberal arts and pure science departments. The Bachelor's degrees of BA or BSc are not intended to signify that the student is qualified for any particular job. The goal of such programs is simply to produce educated persons. Some concentration in certain disciplines is normally demanded to avoid superficial education. However, no one with a BA or a BSc is a fully-qualified professional. A BA or a BSc often plays a second role as a prerequisite to a professional program of study or as a stage towards a PhD in an arts or science discipline.

The non-professional departments in Dalhousie's Faculty of Arts and Science comprise the humanities, including languages, social sciences, life sciences, physical sciences and mathematical sciences. One should sample classes across these areas to have some appreciation of the ways of other disciplines.

The section of the Calendar which follows describes the nature of the subjects which can be studied in the Faculty of Arts and Science at Dalhousie, the content of each of the classes offered, the regulations governing admission, and the awarding of degrees. It is designed to help those who wish to enrol in the Faculty, as well as those who are already enrolled, to make informed choices about their programs of study.

The dean, associate dean and assistant deans of Arts and Science and the chairpersons of the departments and other members designated as faculty advisors, are available for general consultation and are ready to help in the planning of programs of study. In the latter activity they are assisted by the Dean of Freshmen, and all new students are invited to discuss their proposed academic programs with him before registration. The Dean of Student Services, the Dean of Freshmen, and the Registrar are prepared to help in the interpretation of University Regulations and to answer general



questions, while the Director of Awards is available for advice and assistance concerning awards, scholarships, and other financial aid.

Students planning to take a postgraduate degree should consult the department in which they intend to specialize before finally deciding on the choice between a general and an honours undergraduate program.

Officers of the Faculty

Dean of the Faculty of Arts and Science

D.D. Betts, BSc, MSc (Dal), PhD (McG), FRSC, Professor of Physics

Associate Dean of the Faculty

To be appointed.

Assistant Deans of the Faculty

S.A.M. Burns, BA (Acadia), MA (Alta.), PhD (London), Associate Professor of Philosophy

W.R.S. Sutherland, BSc (Mt A), MA, PhD (Brown), Professor of Mathematics

Secretary of the Faculty

A.R. Andrews, BA, Dipl. Ed., MA (Leeds), PhD (Ill.), FRSA Professor of Theatre

Administrator

D.G. Miller, BComm (Acadia)

1. Definitions

For definitions of some commonly used terms, see page 15.

2. Departments of the Faculty of Arts and Science

Biochemistry (also in the Faculty of Medicine)

Biology

Chemistry

Classics

Economics

Education

Engineering

English

French

Geology

German
 History
 Mathematics, Statistics and Computing Science
 Microbiology (also in the Faculty of Medicine)
 Music
 Oceanography
 Philosophy
 Physics
 Political Science
 Psychology
 Religion
 Russian
 Sociology and Social Anthropology
 Spanish
 Theatre

3. Subject Grouping

The various subjects in which instruction is offered are grouped as follows:

- A. Languages:** French, German, Greek, Latin, Russian, and Spanish.
- B. Humanities:** Classics, Comparative Literature, English, History, Mediaeval Studies, Music, Philosophy, Religion, and Theatre.
- C. Social Sciences:** Economics, History, Political Science, Psychology, Sociology and Social Anthropology.
- D. Sciences:** Biochemistry, Biology, Chemistry, Computing Science, Geology, Mathematics, Microbiology, Physics, and Statistics.

Classes are also offered in African Studies, Architecture, Education, Engineering, and Oceanography.

4. Programs Offered

Programs leading to the following qualifications are offered: Bachelor of Arts, Bachelor of Science, Bachelor of Education, Bachelor of Music, Bachelor of Music Education, Diploma in Engineering, Certificate in Costume Studies, Diploma in Costume Studies, Diploma in Meteorology, and Certificate in Educational Administration.

Many of the classes offered may be taken on a non-degree basis by persons who do not wish to study for a degree.

5. Admission Requirements

5.1 Students from Nova Scotia High Schools

At least five senior level university preparatory classes should be taken in the grade XII year as follows:

- (a) English.
- (b) At least two of Biology, Chemistry, French, German, History, Latin, Mathematics and Physics.
- (c) The remaining classes may be from those listed above or from Economics, Geography, Geology, Law, Modern World Problems, Music, Political Science, Sociology, Spanish.

Any special or experimental classes must have been previously approved by Dalhousie if acceptance for credit for admission is to be assured.

A passing grade of at least 50% is required in each class, with an average of at least 60%. Special consideration will be given to grades in English and Mathematics.

For certain programs there are additional requirements. These include the following:

Bachelor of Science; Grade XII Mathematics.

Diploma in Engineering; Grade XII Mathematics, Chemistry and Physics.

For special requirements in Music and Education, see the department entries.

The University does not apply criteria rigidly. Students who do not meet the above requirements, particularly those with high standing, are invited to apply and will be given consideration as special cases.

5.2 Admission from Outside Nova Scotia

Students are accepted from other provinces and countries at levels as shown below, which are considered equivalent for the purpose of admission to Nova Scotia Grade XII:

New Brunswick, Prince Edward Island, Manitoba, Saskatchewan, Alberta and British Columbia: Grade XII, with subject distribution as for Nova Scotia.

Newfoundland: First Year Memorial University of Newfoundland.

Quebec: Two years at CEGEP. In special cases, one year CEGEP (high standing in a strong program required).

Ontario: Grade XIII or very high standing in Grade XII.

U.S.A.: Outstanding students may be admitted from U.S.A. Grade XII on the basis of advanced placement work or high SAT or CEEB scores; transfer credits will be considered for such outstanding students if they have completed a full year of study with good standing (minimum: 30 semester hours) at a recognized university elsewhere. Other students from the U.S.A. can be admitted only after completing a first year at a recognized university (minimum: 30 semester hours) and credit, if any, for that year's work is determined on an individual basis.

The United Kingdom, West Indies, West Africa: General Certificate of Education (GCE) with pass standing in at least five subjects, of which one must be English and at least two must be at Advanced Level.

Hong Kong: GCE as for Great Britain, or University of Hong Kong Matriculation Certificate under same conditions as for GCE.

Bangladesh, India, Pakistan: Bachelor's degree with first or second-class standing from a recognized university; or in certain circumstances, first-class standing in the Intermediate examinations in Arts and Science, provided the candidate has passes at the university level in English, Mathematics, and a language other than English. Note: This standing is not sufficient for admission to the sequential BEd program at Dalhousie.

Countries not mentioned above: Write to the Admissions Office, Dalhousie University, Halifax, N.S. B3H 4H6, for further information.

5.3 Transfers from Colleges and other Universities

Students who have begun their post-secondary studies elsewhere, and who are in good standing, may be considered for admission. Credit for work completed may be granted, subject to the conditions given in section 13, page 26.

5.4 Mature Students and Persons Lacking Normal Admission Requirements

Regulations concerning admissions are not applied rigidly. Applications from persons who lack the normal qualifications, particularly those who have been out of school for some years, are invited. Acceptance may be granted if the admissions committee is satisfied that their standing is such that they may be suitable for, and expected to benefit from, university work. Applicants should submit information about previous studies and relevant experience. Interviews may be required.

5.5 January Admissions

Admission to Dalhousie is normally for classes beginning in September. The University may admit persons for classes beginning in January. Part-time and transfer students will probably be able to plan a satisfactory program of classes starting in January. However, full-time first-year students will usually not be able to plan a satisfactory program because the majority of first-year classes begin in September only. The deadline for applications for January admission is November 15.

5.6 Application Procedures

The following should be submitted:

- (a) a completed application form (for deadlines see the almanac),
- (b) application fee,
- (c) an official record of high school work, and
- (d) an official transcript of the record of work done at previous post-secondary institutions (if applicable).

Applicants for admission whose native language is not English must give evidence that they are proficient in spoken and written English. Evidence may be provided by the English Language Test of the University of Michigan, or the Test of English as a Foreign Language (TOEFL) (normally with a score of at least 550). Both of these tests are administered in various centres throughout the world. Information may be obtained by writing to the English Language Institute, Testing and Certification Service, Ann Arbor, Michigan 48104, U.S.A. or TOEFL Box 899, Princeton, New Jersey 08540, U.S.A.

Certified copies of original documents, or relevant sections of documents (e.g. calendar pages) are acceptable in lieu of originals. Certificates in languages other than English or French must be accompanied by certified translation into English or French.

5.7 Response to Applications

All applications will be acknowledged promptly. At the same time applicants will be advised of any documentation still required.

When documentation is complete, the application will be placed in the hands of the admissions committee for decision. Although every effort will be made to have decisions made quickly it must be recognized that at times there will be some delay, particularly in programs where competition for places is keen.

As soon as decisions are made, whether final admission, conditional admission, deferral or rejection, applicants will be advised.

5.8 Early Acceptance

Applicants currently enrolled in a course of study, who have good records, i.e., normally 70% or better for those in high schools, may be given early acceptance, conditional on satisfactory completion of work for which they are currently enrolled.

6. Student Aid, Scholarships and Other Awards

A separate booklet, Scholarships, Prizes and Financial Aid, is available on request to the Director of Awards and Student Aid, Dalhousie University.

7. Admission to Classes

7.1 Academic Advice

At Dalhousie all students are offered academic advice prior to registration. First year students, particularly those in BA and BSc programs, may wish to consult with the Dean of Freshmen or Registrar, or with a Faculty advisor in an academic department of particular interest. After the first year, students plan their programs in consultation with a Faculty advisor in their major departments. Each student must complete a Class Approval Form, obtainable

from academic departments or the Office of the Registrar. This form must be completed before registering.

For first year students this may be done at any time between June 1 and the last regular registration date. Other students will be given an opportunity to do this prior to the spring convocation, but otherwise must wait until the September registration period.

Students can be registered only after the Class Approval Form is completed and submitted.

**NOTE THAT THE COMPLETION AND
SUBMISSION OF A CLASS APPROVAL FORM
DOES NOT CONSTITUTE REGISTRATION.**

Registration is complete only after the registration form, which will be provided to each eligible student, is submitted to the Office of the Registrar and a receipt is obtained from the Accounts Office.

7.2 Numbering of Classes

Classes are numbered to indicate their general level. Those in the 1000 series are introductory and can normally be taken by fully matriculated students without any previous classes at Dalhousie, while classes in the 2000, 3000, and 4000 series are usually first available to students in the second, third, and fourth years, respectively. Often these classes have prerequisites. Some departments have minimum grade requirements for entry into classes above the 1000 level. Such requirements are listed in the calendar entries for the departments concerned.

The letter following a class number indicates the session in which the class is offered. The letters A and B denote classes given in the first and second terms respectively. The symbol A/B indicates a class given in the first term and repeated in the second term. The letters C and R denote classes spread over both terms, i.e., given for the full academic year. An R class carries one full credit or more, and a C class less than one full credit. For summer sessions, A denotes a class given in the first three weeks, B a class given in the second three weeks, and R and C classes continuing for six weeks.

Classes with numbers below 1000 do not carry credits but may be prerequisites for entry to credit classes for students whose matriculation backgrounds are deficient.

Note that some schools and departments use three digit numbers, modifying the sense of the above paragraph by deleting a zero from each number cited.

8. Registration

Registration material and detailed information will be sent to all eligible students except those admitted late, in which cases documentation must be completed in person. After the Class Approval Form has been completed (see above) students may register, either in person or by mail. Late registration requires approval of the Dean.

**A STUDENT IS REGISTERED ONLY AFTER
FINANCIAL ARRANGEMENTS HAVE BEEN
MADE AT THE ACCOUNTS OFFICE.**

9. ID Card

Upon registration, a receipt which is also a requisition for an ID Card will be issued by the accounts office. An ID Card which gives the student access to many campus services and activities may then be obtained at the ID Unit. The Unit is open during special registration periods, of which all students are notified, and at other times as posted by the Unit, which is located in the basement of the Arts and Administration Building.

10. Withdrawal and Change of Registration

10.1 Responsibility of Registered Students

Students who have registered are responsible for fees. Those who withdraw from the University may be entitled to refunds of fees. Withdrawals are not effective until notification is received at the Office of the Registrar.

NON-ATTENDANCE DOES NOT, IN ITSELF, CONSTITUTE WITHDRAWAL.

10.2 Class Changes

It is recognized that some students may wish to make changes in programs already arranged. Class changes will normally be completed during the second week after the beginning of the class. (For summer session information see the Summer School Calendar.) No change is effective until a change form, available at the Office of the Registrar, is received at that Office.

No class may be added after the second week of classes without special permission from the instructor and the chairperson of the department and payment of a fee. Classes may be dropped until the last day of lectures. See the almanac for dates after which classes will not be removed from records, and the fee section for the schedule of refunds.

11. Degree, Certificate and Diploma Requirements

11.1 Bachelor of Arts, Bachelor of Science — Major Programs

(a) **First Year:** In the first year full-time students normally take five full-credit classes or the equivalent in half-credit classes, chosen from subject groups A, B, C, and D listed in section 3 on page 22. (The King's Foundation Year Program is equivalent to four classes for BA candidates or three classes for BSc candidates. This program is only available to King's students.) For part-time students the first five credits taken constitute the work of the first year.

Students in the first year may not take for credit more than the equivalent of two full-credit classes in a single subject from the subject groups given in section 3 on page 22.

One of the five classes chosen must be selected from a list of classes in which written work is considered frequently and in detail. These writing classes are approved by the Curriculum Committee and are listed below:

Classics 1010, English 100, German 100, 105, History 1400, 1990, Philosophy 1010, 1030, Political Science 1103, Religion 1301, Spanish 1100A/B and 1110A/B. (The King's Foundation Year Program also satisfies this requirement.)

In order to qualify for a BSc degree candidates are required to complete successfully at least one full University class in Mathematics other than Mathematics 102 and Mathematics 110.

Students should seriously consider choosing a class from a list of classes which deal with a formal subject. Classes which are recognized as formal are:

Chemistry 110, 112, 120, Computing Science (all classes), Economics 222A, 2223B, Mathematics (all classes), Philosophy 2110, 2130, 2660, Physics 1000, 1100, 1300, Political Science 2484, 3495.

Students should consider becoming fluent in French.

It is recommended that one class be chosen from each of the groups, A, B, C and D listed in section 3 on page 22. (This recommendation does not apply to students entering the King's Foundation Year Program.)

For students enrolled at the University of King's College, the King's Foundation Year Program offers first-year students in Arts and Science an integrated introduction to the humanities and social sciences through study of some of the principal works of western culture. Details are to be found in the calendar of the University of King's College, and advice may be obtained from the Director of the Program.

If students who have not completed their first year wish to enrol for further study, they must complete the first year requirements at the first opportunity.

(b) **Second and Third Years:** Before registering for the second year, each student must declare a major, or area of concentration, and obtain program advice and approval from a faculty advisor in the major department. (This may be done before registering for the first year, at the option of the student.)

Ten full credits, or the equivalent in half-credit classes, make up the course for the second and third years. These must meet the following requirements:

- (i) at least seven credits shall be beyond the 1000 level.
- (ii) at least one credit or two half-credits shall be in each of at least two subjects other than the major field.
- (iii) at least four and no more than eight credits beyond the 1000 level shall be in a single area of concentration (the major).
- (iv) up to four of the credits in the major subject must be selected in accordance with departmental or interdepartmental requirements.

For the BA, the major may be chosen from Classics, Economics, English, French, German, Greek, History, Latin, Music, Philosophy, Political Science, Religion, Russian, Sociology and Social Anthropology, Spanish, Theatre or from any of the BSc major subjects.

For the BSc the major subject must be chosen from Biology, Chemistry, Computing Science, Geology, Mathematics, Physics, Psychology, or Statistics.

11.2 Arts and Science Electives

Students may choose electives from any of the classes listed by departments offering major or honours programs in the Faculty of Arts and Science. In addition up to three classes may be taken from the following:

- (a) African Studies 200, Architecture 1000, and Comparative Literature 100;
- (b) Education Foundation Offerings (Education classes with numbers below 4400). Note: Education classes numbered 4400 and above are not available as Arts and Science electives;
- (c) Classes in Engineering and Oceanography. Note: The restriction on Engineering electives does not apply to students in the Diploma in Engineering Program who combine their studies with a program leading to a BSc in Biology, Chemistry, Computing Science, Geology, Mathematics, Physics, or Statistics. (See the entry for the Department of Engineering page 67.)
- (d) Classes in Music. Note: Music classes 1000, 2007, 2088C, 2089C, 2010, 2012, and 2013 are available as normal electives, but other classes in Music may be taken by special permission of the Department of Music.
- (e) The following approved classes from other faculties and institutions: Commerce 1101A/B, 1102A/B, 1401A/B, 2201A/B, 2301A/B, 2302B, 2601A/B, 3203A/B, 3304A/B, 3306A/B, 3308B, 3501A/B, 4120A/B and Health Education 4412. Note: students enrolling in elective classes must meet normal class prerequisites.

Individual Programs: In cases where students feel that their academic needs are not satisfied under the above requirements, individual programs may be submitted to the Curriculum Committee. The Dean shall act as advisor for such students.

11.3 Bachelor of Arts and Bachelor of Science — Honours Programs

Second, Third and Fourth Years: Able and ambitious students are urged to enter an Honours Program. These programs require a higher quality of

work than is required by major programs. Note that the Department of Biochemistry and Microbiology offer honours programs, but not major programs.

There are three types of honours programs: major, combined and unconcentrated.

Application for admission to an honours program must be made to the departments concerned on forms available in departments and at the Office of the Registrar. The Registrar may be consulted by those considering unconcentrated honours.

Students should apply before registering for the second year. If application is made later, it may be necessary to make up some work not previously taken.

All of the regulations for the BA or BSc major program must be satisfied, and there are additional requirements as follows:

Honours in a major program is based on the general requirement that the 15 credits beyond the first year of study comprise:

- (a) A normal requirement of nine credits beyond the 1000 level in one subject (the major subject). Students may, with the approval of the department concerned, elect a maximum of eleven credits in this area. In this case (c) below will be reduced to two or three credits.
- (b) Two credits in a minor subject satisfactory to the major department.
- (c) Four elective credits not in the major field.
- (d) An additional grade (see Honours Qualifying Examination below).

Honours in a combined program is based on the general requirement that the 15 credits beyond the first year of study comprise:

- (a) A normal requirement of eleven credits beyond the 1000 level in two allied subjects, not more than seven credits being in either of them. Students may, with the approval of the departments concerned, elect a maximum of thirteen credits in two allied subjects, not more than nine credits being in either of them. In this case the requirement in (c) below is reduced to two credits.
- (b) Four elective credits in subjects other than the two offered to satisfy the requirement of the preceding clause.
- (c) An additional grade (see Honours Qualifying Examination below).

Details of specific departmental honours programs are given under departmental listings of Programs of Study.

Unconcentrated Honours programs are based on the general requirement that the 15 credits, beyond the first year of study comprise:

- (a) Twelve credits beyond the 1000 level in three or more subjects. No more than five of these may be in a single subject; no less than six nor more than nine may be in two subjects.
- (b) Three elective credits. (see 11.2 above)
- (c) For an Unconcentrated BA (Honours), at least ten credits of the twenty selected must be selected from subject groups A, B, and C listed on page 22.
- (d) For an Unconcentrated BSc (Honours), at least eight credits of the twenty required must be selected from Biochemistry, Biology, Chemistry, Computing Science, Geology, Mathematics, Microbiology, Physics, Psychology, and Statistics, and at least six additional classes must be selected from subject groups C and D listed on page 22.
- (e) An additional grade (see Honours Qualifying Examination below).

Honours Qualifying Examination: At the conclusion of an Honours program a student's record must show a grade which is additional to those for the required twenty classes. This grade may be obtained through a com-

prehensive examination, the presentation of a research paper (which may be an extension of one of the classes), or such other method as may be determined by the committee or department supervising the student's program. The method by which this additional grade is obtained is referred to as the Honours Qualifying Examination. Departments may elect to use a pass-fail system for this examination.

For the standing required for honours see section 22.3 on page.

11.4 Conversion of a BA or BSc to an Honours Degree

A person who holds a BA or BSc may apply through his/her department advisors for an honours program. On completion of the required work with proper standing, a certificate will be awarded which has the effect of upgrading the degree to honours status.

11.5 Co-operative Education Programs

Certain departments, currently Chemistry, Physics and Mathematics, Statistics and Computing Science, offer integrated programs of academic study and supervised work terms. On completion of the programs, Honours degrees in the relevant disciplines are awarded. For details, see the entries for the departments named above.

11.6 Joint Honours: Dalhousie-Mount Saint Vincent

Special arrangements exist under which students may be permitted to pursue an honours program jointly at Dalhousie and Mount Saint Vincent Universities. Interested applicants should consult the appropriate department of their own university at the beginning of the second year. Prospective joint honours students must be accepted by the major departments concerned at both institutions. These departments supervise the entire program of study of accepted applicants. Students should be aware that not all classes available for credit at Mount Saint Vincent can be given credit at Dalhousie and vice versa. In order for students to obtain a joint honours degree they must satisfy all requirements of both institutions.

11.7 Bachelor of Music and Bachelor of Music Education

For the special requirements of these degrees, see the entry for the Music Department, page 102.

11.8 Diploma in Engineering

For details of the requirements for the diploma, see the entry for the Department of Engineering on page 67.

11.9 Bachelor of Education

Admission to this program normally requires that the applicant holds a prior undergraduate degree, or is simultaneously enrolled for one. There is, however, an arrangement under which it is possible to obtain a BEd in association with the Nova Scotia Teachers College as a first degree.

For details about BEd programs, see the entry for the Department of Education, page 59.

11.10 Certificate and Diploma in Costume Studies

Study for these credentials is given entirely within the Department of Theatre. See the entry for that department for detailed information, page 140.

11.11 Certificate in Educational Administration

For details about this program, see the entry for the Department of Education, page 59.

11.12 Diploma in Meteorology

Details of the requirements for this diploma may be found in the entry of the Department of Physics, page 113.

11.13 Transition Year Program

For details about the program, see the entry on page 143.

12. Counting of Classes for Two Undergraduate Degrees

Students who hold one undergraduate degree from Dalhousie and who wish to gain a second undergraduate degree must fulfil the requirements of the second degree and meet the following stipulations:

- (a) Only classes that are applicable to the course for the second degree may be counted for credit.
- (b) Each class carried forward must have a grade of C or higher.
- (c) A minimum of six new full credit classes must be taken, (11 for a 20 credit program,) four of which must be above the 1000 level in a new area of concentration and two normally in other subjects.
- (d) Merit points must be scored on the new classes as required by Regulation (22.1) below:

Students intending to gain a second undergraduate degree should consult with the department in which the new major classes will be taken to plan their program of studies. Application must be made to the Registrar prior to enrolment in any of the classes which constitute the minimum additional requirement. This application must give details of the proposed program and must be supported by the new major department.

Students who hold one undergraduate degree from another recognized university, and who wish to gain a second undergraduate degree from Dalhousie University, must complete at least half of the classes for that degree at Dalhousie. Accordingly, they must meet the requirements set out in (a) above but must take a minimum of seven and one half credits for a 15 credit program, at least four of which must be above the 1000 level in a new area of concentration, and at least two in other subjects. At least 10 credits must be taken at Dalhousie for a 20 credit program.

13. Transfer Credit

- (a) Students from another college or university who are not eligible for readmission to that college or university will not be admitted to Dalhousie.
- (b) No credit will be given for any work used as the basis for admission.
- (c) No transfer credit will be granted for any class in which a final mark of less than C (or the equivalent in Dalhousie terms) was obtained, or for any class in which a final mark was granted conditionally.
- (d) To obtain a first degree or diploma from the Faculty of Arts and Science, at least half of the classes, including at least half in the field of concentration, must normally be taken at Dalhousie.
- (e) Students in Arts and Science who wish to complete an honours program must attend Dalhousie for the last ten credits unless special permission to the contrary is obtained from the Committee on Studies.
- (f) No classes taken at another institution will be counted towards fulfillment of the concentration requirement of the Bachelor's degree or the principal subject requirement of an honours program without specific advance approval from the department concerned at Dalhousie.
- (g) Transfer credits may be granted only for classes which are offered by a recognized university or equivalent institution of higher learning and which are judged to be of comparable standard to classes offered at Dalhousie and to be appropriate to an academic program of the faculty.
- (h) Transfer credits for classes that lie within the scope of Dalhousie departments are subject to approval by those departments.
- (i) Transfer credits are not normally granted for classes that are not within the scope of any Dalhousie department. Students may, however, apply to the Committee on Studies for credit for such classes but they must justify the inclusion of such classes in their proposed program.
- (j) No credit will be given for any classes taken at another university while a student is inadmissible at Dalhousie. Students who have been permitted to reregister, after having been declared ineligible at Dalhousie, cannot take classes at another institution for Dalhousie credit until they have taken further Dalhousie classes.

14. Advanced Placement

Students possessing advanced knowledge of a subject which was acquired other than at a university will be encouraged to begin their studies in that subject at a level appropriate to their knowledge, as determined by the department concerned, and will be exempted from any classes which are normally prerequisites for the one to which they are admitted. However, such students must substitute for the exempted classes an equal number of other classes, not necessarily in the same subjects (i.e. they must complete at Dalhousie the full number of credits required for the particular credential being sought).

15. Part-Time Students

Part-time students are admitted to most of the programs offered in the Faculty. Admission requirements and regulations generally are the same for all students. For part-time students the first five credits taken constitute the work of the first year. Part-time students are encouraged to consult with the Dean of Continuing Education for advice on their academic programs and other matters.

16. Audit of Classes

Students who have been admitted to the faculty are permitted to audit many of the classes offered. For those who are not full-time students, fees are payable as given on page 16. A class may not be changed from credit to audit or from audit to credit status after the last date for dropping classes without penalty (see the almanac, page 4). In order to change from audit to credit prior to the deadline an additional fee is required. Permitted changes require that the procedures as given in section 10.2 on page 24 be followed.

17. Duration of Undergraduate Studies

Students are normally required to complete their undergraduate studies within ten years of their first registration, and to comply with the regulations in force at the time of that registration. This is also the normal limit for transfer credits. However, the Committee on Studies may grant permission to continue studies for a reasonable further period, subject to such conditions as the Committee deems appropriate and with the stipulation that the student must meet the degree requirements in force when the extension is granted.

18. Preparation for Other Programs

Work in the Faculty of Arts and Science is prerequisite for various programs in other faculties and other institutions such as the Technical University of Nova Scotia and the Nova Scotia College of Art and Design. A brief summary of the academic work required for admission to certain programs is given here. Further information may be found later in this calendar, or in the separate faculty calendars, or in the calendars of other institutions.

Occupational Therapy or Physiotherapy: One year of work in the Faculty of Arts and Science, or the equivalent elsewhere, is required for admission to these two programs. For details, see the entries in this calendar for the School of Occupational Therapy and the School of Physiotherapy.

Medicine: At least two years of work at Dalhousie, or the equivalent elsewhere, including English 100, Biology 1000 or 2000, one of Chemistry 110, or 111, or 120, Chemistry 240, Physics 1000, or 1100, or 1300 or equivalent classes.

Dentistry: As for medicine.

Law: At least two years of work leading to one of the degrees of BA, BSc, BComm.

Engineering: The Diploma in Engineering qualifies a student for entry to the Technical University of Nova Scotia to study Engineering.

Architecture: Two years of work, including at least one class in mathematics, are required for entry to a program in Architecture at TUNS. For details, apply to the Faculty of Architecture at TUNS.

Engineering Physics: A degree in Engineering Physics is offered by the Technical University of Nova Scotia in cooperation with Dalhousie. The diploma in Engineering is prerequisite for admission to this program at TUNS.

Design: Students completing one year in the Faculty of Arts and Science of Dalhousie may be admitted into the second year of the four-year program leading to the Bachelor of Design degree in Communication Design or Environmental Design at the Nova Scotia College of Art and Design.

Graduate Studies: The normal requirement for admission to a graduate program is an honours degree in an appropriate discipline, or the equivalent.

19. Assessment

19.1 Method

Examinations may be oral, written, (closed or open book); under supervision or take-home. To gain credit toward a degree or diploma, students must appear at all examinations, prepare such essays, exercises, reports, etc., as may be prescribed, attend the classes of their prescribed course to the satisfaction of the instructors and, in a class involving field or laboratory work, complete such work satisfactorily.

Within two weeks of the first meeting of a class, each instructor shall make available a written description of the method of evaluation to be used in this class including information on the availability of a supplemental examination and the proportion of the grade to which such an examination would apply; within four weeks after the beginning of each term the department chairperson must report to the Dean the method of evaluation to be used by each instructor in each class.

19.2 Examinations and Tests

Periods of approximately two weeks in the spring and one and one-half weeks in December are set aside for the scheduling of formal written examinations by the Registrar. Instructors wishing to have an examination scheduled by the Registrar for their classes must so inform the Registrar at the beginning of the 3rd week of classes in the fall and spring terms. Instructors may also arrange their own examinations at a time and place of their choosing during the formal examination periods, with the understanding that in cases of conflict of examinations for an individual student, the Registrar's examination schedule takes priority. No tests or examinations covering the work of a whole term shall be held during the last two weeks of classes in the term. No tests may be held between the end of classes and the beginning of the official examination period.

19.3 Grades

A letter grade system is used to evaluate performance. Grades in the A range represent excellent performance, grades in the B range represent very good performance, and those in the C range represent satisfactory performance. A grade of D represents marginally acceptable performance except in programs where a minimum grade of C is specified. See the calendar entry for specific programs where a minimum grade of C is specified. F and FM indicate failure, marginal in the case of FM.

19.4 Submission of Grades

On completion of a class, the instructor is required to submit grades to the Registrar, such grades to be based on the instructor's evaluation of the academic performance of the students in the class in question. Christmas grades must be submitted to the Registrar in all 1000-level classes in which enrollment on October 1 exceeded 25. Christmas grades are normally submitted in other full-year classes.

19.5 Incomplete

Students are expected to complete class work by the prescribed deadlines. Only in special circumstances may an instructor extend such deadlines. Incomplete work in a class must be completed within four weeks of the required date for submission of grades in that class to the Registrar's Office.

Exceptions to this rule will normally be extended only to classes which require field work during the summer months. At present the list of these classes consists of Biology 4800 and 4900, Music 3470C and 4470C. Students taking any of these classes in their final year should note that they will not be able to graduate at the spring convocation.

19.6 Correction of Errors in Recorded Grades

Correction of errors in the recording of a grade may be made at any time. Otherwise changes will only be made as in Regulation 19.7 below.

Students are not entitled to appeal for any grade change more than six months after the grades are sent from the Registrar's Office.

19.7 Reassessment of a Grade

On payment of a fee, a student may appeal to the Registrar for reassessment of a grade in a class. The Registrar will direct the request to the head of the academic unit concerned, who will ensure that the reassessment is carried out and reported to the Registrar. Written applications for reassessment must be made to the Registrar within two months of the date the grade is sent from the Registrar's Office. Students have a right to view their marked examination papers by appointment for a period of two months from the date the grades are sent to students from the Registrar's Office.

19.8 Special Examinations

Special examinations may be granted to students in the case of illness supported by a medical certificate, or in other exceptional circumstances. Medical certificates must be submitted at the time of the illness and will not normally be accepted after a lapse of one week from the date of the examination. Students wishing to appear as candidates at a special examination shall be required to give notice of their intention to the Registrar's Office on or before January 25 for a fall term or July 10 for a spring term class. Students wishing to write at outside centres must also apply by the foregoing dates.

19.9 Supplemental Examinations

One full credit supplemental examination (or two half credit supplemental examinations) may be written by any student on the work of any one year, provided that:

- (a) the student has obtained a final grade of FM in that class,
- (b) the student has satisfied the requirements for the class,
- (c) a single compulsory final examination or test in the class in question accounted for at least forty per cent of the final grade (the supplemental examination should — at the discretion of the department — constitute the same proportion of the final grade as did the final examination during the regular session), and
- (d) the student has not been required to withdraw from the Faculty.

Apart from the case of "A" classes (given in the fall term), the supplemental examinations must be written in the following September. For "A" classes, supplemental examinations must be written in February immediately following the failure. Supplemental examinations may not be deferred.

Eligible students who wish to write a supplemental examination must submit to the office of the Registrar a completed application form (which may be obtained from that office) and the required fee by July 10 for the September examination, and January 25 for the February examination.

Students who fail to pass the supplemental examination can obtain credit for that class only by repeating it.

Students may not write both a supplemental examination and an examination at the end of Summer School in the same class in the same year. No

supplemental examinations are allowed for classes taken at Summer School. No more than five credits obtained as a result of supplemental examinations may be counted toward a degree.

20. Repeating Classes for Which a Passing Grade has been Awarded

With the permission of the department concerned and the endorsement of the Committee on Studies, students may repeat any class for which a passing grade has previously been awarded. The original passing grade will nevertheless remain on the transcript and a second entry will be recorded with the new grade and the notation "repeated class." No additional credit will be given for such a repeated class, but the higher grade, or point count appropriate to it, will be used for degree purposes. Note that both grades are used in calculating the merit point total, when a degree with distinction is awarded.

21. Merit Points

21.1 Scale

Merit points are awarded for each class as follows:

Grade	Points
A+, A, A-	3
B+, B, B-	2
C+, C, C-	1
D	0

For merit points for transfer credits see 21.2 below

Note that although D is usually a passing grade, no merit points are awarded. For fractional credit classes, corresponding fractional merit points are awarded (e.g. in a half-credit class, a B would yield one point).

21.2 Merit Points for Classes Transferred From Other Institutions

One merit point is awarded for each class transferred from another institution except where:

- the external classes are taken to pursue a program of study approved in advance by the Faculty (at the present time this refers only to the programs at Stirling University, Université de Provence (Aix-Marseilles), the Pushkin Institute, Leningrad University and the Colegio de Espana),
- the performance in the external class is first class, and
- these classes are approved by the Committee on Studies for that purpose for the particular student.

In these cases merit points may be awarded on the basis of equivalent Dalhousie standing. Departmental advice on the equivalent Dalhousie grade for a particular class is sought where necessary.

22. Required Standing

22.1 For a BA or BSc Degree

A minimum of twelve merit points on the fifteen credits offered is required for the awarding of a BA or BSc.

22.2 For a BA or BSc with Distinction

At least 40 merit points are required. This number is prorated upward if more than fifteen credits appear on the student's record. For the purpose of determining a BA or BSc with distinction all Dalhousie classes, including repeated classes, and classes for which non-passing grades were obtained, are included. At least 10 Dalhousie classes must be included. The Committee on Studies will monitor the records of graduating students having transfer credits and will bring to Faculty appropriate recommendations for a degree with distinction in any case where the regulations regarding transfer credits appear to create injustice.

22.3 BA or BSc with Honours and First Class Honours

Students who have not obtained a grade of B- or better in five advanced classes, that is, classes other than electives, will not be admitted to the fourth Honours year without explicit Departmental recommendation and prior approval of the Committee on Studies.

To count towards an Honours degree each advanced class, i.e., each class of the second, third, and fourth years, except electives, must be passed with a grade of at least C. Should D or C- be received, it must be made good by repeating the class and achieving a C or better grade or by taking an additional advanced class (preferably in the same subject). Otherwise the student must transfer out of the Honours program.

In five of the advanced classes in a student's Honours program, a grade of B or better must be achieved, and in three additional advanced classes, a grade of B- or better is required. For first class Honours, students must achieve either:

- grades of A or better in four advanced classes and of A- or better in four additional advanced classes, or
- grades of A or better in six advanced classes and of B or better in all advanced classes.

The Honours Qualifying Examination as prescribed by the department(s) concerned must be passed. This is the additional grade referred to in section 11. Unless Pass-Fail grading is employed, the grade must be B- or better and for first class Honours, A- or better.

23. Change from BA to BSc program and vice versa

According to present regulations all students who have completed all the requirements for a BSc degree have automatically completed all the requirements for a BA degree. Similarly most students who have completed all requirements for a BA degree in a science subject will have automatically completed all requirements for a BSc degree. However, students who are registered for a BSc degree and wish to be awarded a BA degree or vice versa must do so by changing their registration at the Office of the Registrar.

24. Workload

24.1 Regular Year

Five full credits per academic year shall be regarded as constituting a normal workload for a student. Written permission from the Committee on Studies is required if this workload is to be exceeded, or if the planned workload in any term would amount to the equivalent of six half-credit classes. In no case may be overload exceed this. Applications from students who give good reasons for wishing to take an overload, and who in the preceding year completed a full program in good standing, will be considered. Such permission will not normally be granted to any student in the first year of study, or to any student who, in the preceding academic year, earned fewer than ten merit points. Applications from students who were part-time during the preceding year will be considered if they have completed at least five classes and earned on average at least two merit points per class.

24.2 Summer Sessions

Students may not take more than one full credit in any summer session, nor may the workload in any one week exceed one sixth of a credit. Exceptions will normally be granted by the Committee on Studies only in respect to attendance at a university which operates a trimester system or its equivalent. In all cases, permission to exceed the normal workload must be obtained in advance.

25. Required Withdrawal

Any student who has accumulated more non-passing grades than the number of merit points earned (see section 21 above), is required to withdraw from the Faculty. This regulation applies once students have obtained four full credits after admission or readmission.

26. Readmission after Required Withdrawal

Students who have been required to withdraw from the Faculty of Arts and Science may apply to the Admissions Committee to be considered for readmission.

A student who has been required to withdraw twice will be ineligible for readmission to the Faculty as either a full-time or a part-time student. Ordinarily an appeal is allowed only if illness has seriously interrupted the student's studies and this is established by submission to the Registrar of a medical certificate from the physician attending the student at the time of the illness.

27. Off-Campus, Summer School and Correspondence Classes, and Classes Taken at Other Universities under Concurrent Registration

Students should note the special limitations that apply.

27.1 Off-Campus Classes

A maximum of three credits may be taken by off-campus classes, whether offered by Dalhousie or taken from another university under concurrent registration.

27.2 Summer School

Dalhousie currently offers two summer sessions of approximately six weeks each, one in May-June and the other in July-August. See Regulation 24.2 for permitted work-load. The maximum number of credits that may be gained by summer school and correspondence classes combined is five.

Those interested in summer school may request a summer school calendar from the Office of Part-Time Studies and Extension, Dalhousie University.

27.3 Correspondence Classes

At present no correspondence classes are offered by the Faculty of Arts and Science. Students who wish to take correspondence classes from other institutions may apply as in 27.4 below. See the limitation referred to in 27.2 above.

27.4 Classes Taken at Other Universities Under Concurrent Registration

Students who wish to take classes at other institutions while registered at Dalhousie, whether in the academic year or in summer sessions, or by correspondence, must obtain approval in advance on a form available in the office of the Registrar. A letter of permission will be provided if approval for the classes is given. The workload at the other institution must conform to Dalhousie's limitations. The departments of French, German, Russian, and Spanish have special arrangements whereby up to a total of 5 full-credit classes taken at other universities may be considered as part of a student's major program at Dalhousie.

The class fee will be paid by Dalhousie if:

- (a) the student is registered as a full-time student at Dalhousie,
- (b) the classes are approved as part of the student's program, and
- (c) the class is not part of a summer school program.

Note that classes taken elsewhere under Concurrent Registration are treated as transfer classes for purposes of record. Merit points are awarded in accordance with 21.2 and not more than half of the work for any credential may be by transfer credit.

28. Coordinated Programs

Students may in their second and third years follow a two-year or two one-year integrated program(s) of study. If two one-year programs are chosen, they may be in different departments. All such coordinated programs have been explicitly approved by the Curriculum Committee. A department or group of departments offering coordinated programs may structure them as it wishes, consistent with sound academic practice and subject to the following guidelines:

- (a) that the equivalent of five class units constitute a normal year,
- (b) that the function of each program form part of the Calendar description of each program,
- (c) that each two-year program permits students at least one class of their own choice in each of the second and third years,
- (d) that two-year programs normally not be exclusively in a single discipline,
- (e) that the normal prerequisite for entry into a department one-year or two-year program be the introductory class of the department in question, or an equivalent that the department considers acceptable, and not more than one introductory class in a related subject.

A student considering a Coordinated Program should consult as early as possible with the departments concerned.

29. Experimental Classes

Experimental classes, on any subject or combination of subjects to which arts or sciences are relevant, and differing in conception from any of the classes regularly listed in departmental offerings, may be formed on the initiative of students or faculty members.

If formed on the initiative of students, the students concerned shall seek out faculty members to take part in the classes.

Whether formed on the initiative of students or on the initiative of faculty members, the faculty members who wish to take part must obtain the consent of their department.

The class may be of one-year length or half-year length.

A class shall be held to be formed when at least one faculty member and at least eight students have committed themselves to taking part in it for its full length.

Classes may be formed any time before the end of the second week of classes in the fall term to run the year or first half year, or any time before the end of the second week of classes in the spring term. If they are formed long enough in advance to be announced in the Calendar, they shall be so announced, in a section describing the Experimental Program, if they are formed later, they shall be announced (a) in the Dalhousie Gazette, (b) in the Dal News, (c) on a central bulletin board set aside for this purpose.

One faculty member taking part in each experimental class shall be designated the rapporteur of the class with responsibility for (a) advising the Curriculum Committee of the formation and content of the class; (b) obtaining from the Curriculum Committee a ruling as to what requirement or requirements of distribution and concentration and credit the class may be accepted as satisfying; (c) reporting to the Registrar on the performance of students in the class; (d) reporting to the Curriculum Committee, after the class has finished its work, on the subjects treated, the techniques of instruction, and the success of the class as an experiment in pedagogy (judged so far as possible on the basis of objective comparisons with more familiar types of classes).

Students may have five one-year length experimental classes (or some equivalent combination of these with half-year length classes) counted as satisfying class for class any of the requirements for the degree, subject to the rulings of the Curriculum Committee (above) and (where relevant) to the approval of the departments.

30. International and Exchange Programs

The Faculty of Arts and Science offers a number of programs which enable students to pursue part of their studies in a foreign-language environment. These include:

- (a) One term of study at the Pushkin Institute or Leningrad University, U.S.S.R. (for details see the entry of the Russian Studies Program, page 131).
- (b) One term of study at Colegio de Espana, Salamanca, Spain (see the entry for the Spanish Department, page 137).
- (c) Up to one full year of study in a foreign-language environment. In recent years students have studied at Tours and Aix-en-Provence in France (consult the appropriate Language department).
- (d) Up to one full year of study at a francophone university in Quebec (consult the Department of French).

There is currently one exchange program. This is for third year honours students in various disciplines, at the University of Stirling in Scotland. (For further information, consult Dr. James Gray, Department of English.)

31. Appeals

Any students who believe they will suffer undue hardship from the application of any of the regulations of the Faculty may appeal for relief to the Committee on Studies. Students wishing to appeal a decision based on Faculty regulations may obtain a copy of the document "How to appeal a Faculty of Arts and Science regulation" from the Office of the Registrar or their department. Briefly, such an appeal must be addressed in writing to the Chairman of the Committee on Studies, c/o Registrar's Office and must clearly state the arguments and expectations of the petitioner.

32. Almanac

The almanac is given on page 4. All concerned should note dates of registration, examinations, convocations, permitted withdrawals, etc.

33. Fees

Information about fees is given on page 16.

34. Changes in Regulations

In general, any change which affects a currently registered student adversely will not apply to that student. Any student suffering *undue hardship* from application of any of the regulations may appeal for relief to the Committee on Studies.

35. Senate Regulations

In addition to the above Faculty Regulations, students are reminded that they must also comply with the University Regulations printed at the front of this Calendar. Particular attention is drawn to University Regulation no. 17 which refers to plagiarism.

African Studies

Director

Timothy M. Shaw, BA, MA, PhD

Professor Emeritus

Z.A. Konczacki (Economics)

Professors

J.H. Barkow (Sociology & Social Anthropology)*

E. Borgese (Political Science)

J.E. Flint (History)*

E. Gold (Law)*

K.A. Heard (Political Science)

R.I. McAllister (Economics)*

T.M. Shaw (Political Science, Dir., African Studies)*

D. Shires (Family Medicine)

R.J. Smith (English)

J.B. Webster (History)* (sabbatical)

Associate Professors

B. Lesser (Economics)

L. Osberg (Economics)

Assistant Professors

D. Luke (Public Administration & Political Science)*

B. Jamieson (Economics and Public Administration)

J. Parpart (History)*

M. Welton (Education)*

Others

G. Garlock (Deputy Librarian, Killam Library)

G. Nikoi (Senior Research Fellow, CIDA, Centre for African Studies)*

A. Nikoi (Senior Research Fellow, CIDA, Centre for Development Projects)

R. Sargent (Lecturer, History)*

* denotes member of Executive Committee

This Centre, established in 1975, coordinates teaching, seminar, research and publications programs in African Studies. Its staff holds primary appointments in departments in the social sciences and the humanities. It encourages interdisciplinary interaction at all levels on African subjects and concepts and organises occasional workshops on topical African issues.

The undergraduate program in African Studies offers an opportunity to integrate classes from a number of disciplines. The major focus is Africa; the minor focus is development. Five classes beyond the first year deal with African cultures, economics, history, literature and politics; the remaining classes are concerned with development and change.

Students wishing to read towards a BA with a concentration on African Studies should note the following recommendations and regulations:

1. It is strongly recommended that in the first year students should read three of: Economics 1100 or 1120. English 100. History 1400. Political Science 1100, 1101 or 1103. Sociology 1000 or 1100, or Spanish 111A.
2. In the second and third years at least seven of the ten required for a degree must be chosen according to the following regulations:
 - (a) African Studies 2000 (compulsory)
 - (b) Four classes to be chosen from List I below (Direct focus on Africa)
 - (c) A further two classes must be chosen from List I or List II, the latter list being classes concerned with the problems of development and underdevelopment.
 - (d) Two of the ten classes must be at the 3000 level.

Classes Offered

2000 Problems in Contemporary Africa: This class provides a general and comprehensive introduction to contemporary issues and institutions in Africa. It concentrates on the current political, social and economic scene: the *African Condition* of crises and constraints. Topics include contemporary history, African literature, social change, problems of development, and prospects for unity. Illustrations are drawn from sub-Saharan Africa, although the class provides an overview of current questions and concepts relevant to the continent as a whole.

List I

(See respective disciplinary sections of the calendar for class descriptions. Note that not every class is offered each year).

Economics 2250, Applied Development Economics

English 217, African Literature

History 2401A Pre-colonial Tropical Africa

History 2402B, Modern Africa

History 3440, African History from Oral Tradition

History 3450A/B, Southern Africa

Political Science 3315A, African Politics

Political Science 3345A, South Africa: The Dynamics of Political Groups and Group Domination

Political Science 3540A, Foreign Policies of African States

Political Science 3544B, Conflict and Cooperation in Southern Africa

Political Science 3590, Politics of the Sea

List II

Economics 3317B, Poverty and Inequality

Economics 3330A/B, International Trade

Economics 3333A/B, Theories of Economic Development

Economics 3334A/B, Economic Development: Recent Debates,

Controversies and Conflicts

Economics 3341A, Urban Economics: Growth and Development of Urban Areas

Economics 4431A/B, International Payments

History 2130, British Empire and Commonwealth

History 2370, Age of Imperialism, 1870-1970

History 2380, Latin America: independence and after

History 2501A/B, Middle East

History 2600, Modern East Asia

History 3360, Enslavement and Emancipation: Afro-Americans in the U.S. South up to 1900

History 3390, Empire and Revolution in the Caribbean

History 3612A/B, Women in Socialist Society: Soviet, Cuban and Chinese experiences

Political Science 2300, Comparative Politics

Political Science 2500, World Politics

Political Science 2505, International Politics in the Post-War World

Political Science 3303B, Human Rights and Politics

Political Science 3340A, Problems of Development

Political Science 3531A, United Nations in World Politics

Political Science 3535B, Towards a New World Order

Sociology 2020, Comparative Sociology and Social Anthropology

Sociology 2370/2380, Peoples and Cultures of the World I/II

Sociology 2400, Medicine and Health Across Cultures

Sociology 3060B, Modernisation and Development

Spanish 207B, Area Studies on Mexico and Central America

Spanish 209B, Women in Latin America

Spanish 211B, The Cuban Cultural Revolution

Spanish 213B, Latin American Dictators: in the Novel

Spanish 307A, Contemporary Latin American History

Ancient History

See under Classics

Anthropology

See under Sociology and Anthropology

Architecture

1000 Introduction to Architecture: lecture seminar 1 hour, practical 2 hours, staff. An introductory class showing architecture as a bridge between the Arts and Science providing an insight into professional architectural studies. In the first term discussion centres around some components of architectural design; in the second term, architecture in present day life. Available as an elective in the general degree programs in Arts and Science.

Biochemistry

Head of Department

R.W. Chambers

Professors

A.H. Blair, BA, MSc (UBC), PhD (Calif.)
 R.W. Chambers, BA, PhD (Calif.)
 W.F. Doolittle, AB (Harv.), PhD (Stan.)
 M.W. Gray, BSc, PhD (Alta.)
 C.W. Helleiner, BA, PhD (Tor.)
 C.B. Lazier, BA (Tor.), MSc (UBC), PhD (Dal)
 F.B.St.C. Palmer, BSc, PhD (W. Ont.)
 D.W. Russell, B.Pharm., PhD, DSc (Lond.), BEd (Dal)
 S.D. Wainwright, BA (Cantab.), PhD (Lond.)

Associate Professors

W.C. Breckenridge, BSc (Kingston), MSc, PhD (Tor.)
 P.J. Dolphin, BSc, PhD (Southampton)
 R.G. Fenwick, BA (Miami), PhD (Tennessee)
 F.I. Maclean, BA, MA (Tor.), DPhil (Oxon.)
 C. Mezei, MSc, PhD (UBC)
 R.A. Singer, AB (Princeton), PhD (Harv.)
 J.A. Verpoorte, BSc, Drs. (Utrecht), DSc (Pretoria)

Assistant Professors

M.W. Spence, MD (Alta.), PhD (McG.)
 L.C. Stewart, BSc, MSc (McG.)
 M.H. Tan, BSc, MD (Dal)

Lecturers

D.E.C. Cole, BSc, MD (Tor.), PhD (McG.)
 H.W. Cook, BSc, MSc (McG.), PhD (Dal)
 R.A. Mulrone, BSc (Ott.), PDt (Montreal), MSc (Wisc.)

Biochemistry is the study of biological function at the molecular level. Although biochemical processes follow the basic laws of physics and chemistry, living organisms, because of their complexity, operate on a set of distinct principles that are not found in simple isolated chemical systems. The goal of biochemistry is to elucidate these principles. The department offers an integrated series of classes that will provide students with an up-to-date view of modern biochemistry ranging from structure-function relationships in macromolecules to the dynamic aspects of metabolism and genetic information transfer.

Degree Programs

There is no three-year program with a Biochemistry major. Students wishing to include Biochemistry in other three-year programs are welcomed. They should take Biochemistry 2000 and 2600 (Biology 2015 and 2012), or Biology 2020 and 2110 in their second year. Note that all Biochemistry classes have prerequisites.

BSc with Honours in Biochemistry

This is a special Major Honours Program. Because Biochemistry and Chemistry are closely interwoven both conceptually and experimentally, the list of major classes required (see page 25) includes both subjects to a total of 10½ credits. Additional chemistry classes may be taken as electives, or by choosing Chemistry as a minor subject. Students are strongly urged to include Mathematics 106 and Biology 2030 and 2100 in their programs, and should consider also Biology 3070.

Year I: Chemistry 110 or 120; Biology 1000; Physics 110; Mathematics 1000 & 1010; a "Writing Class" (see page 24).

Year II: Biochemistry 2000 and 2600; Chemistry 220, 231, 232, & 240; and one full credit in the minor subject.

Year III: Biochemistry 3200, 3300, & 3400; Chemistry 341 & 343; one half-credit elective (any subject); one full credit elective (not Biochemistry nor minor); and one full credit in the minor subject.

Year IV: Biochemistry 4602; three more full credits in Biochemistry, including at least one half-credit in each of the following areas: Metabolism (43xx), Molecular Biology (44xx), and Physical Biochemistry (47xx); one full credit elective (not Biochemistry nor minor).

A minor subject (see page 25) should be chosen in consultation with the department's Academic Advisor.

BSc with Combined Honours in Biochemistry and another science area

Biochemistry may be offered along with one of Biology, Chemistry, Microbiology, Physics, or possibly another subject, for a Combined Honours Program. Consult the Department for details.

Classes Offered

The Department also teaches students in Dental Hygiene, Dentistry, Medicine, and Nursing; these classes are described in the appropriate sections of the Calendar.

2000 (Biology 2015) Cell Biology and Biochemistry: lecture 3 hours, Biology and Biochemistry faculty members. Prerequisites: Biology 1000 and Chemistry 110 or 120. Described under Biology 2015.

2600A or B (Biology 2012 A or B) Laboratory Techniques for Cell and Molecular Biology: lecture 1 hour, tutorial 1 hour, lab 3 hours, Biology Department members. Prerequisites: Biology 1000 and Chemistry 110 or 120. Described under Biology 2012.

3100 Biochemistry for Students of Pharmacy: lecture 3 hours, D.W. Russell, lab 3 hours, L.C. Stewart. For pharmacy students in their third year, this class provides a basic knowledge and understanding of the three main areas of modern biochemistry: the chemistry of cell constituents, metabolism, and biological information. The main focus is on the chemistry of human body function and the effects upon it of outside agents.

Biochemistry 3200, 3300, and 3400 are half-credit classes, each of which deals with one important aspect of biochemistry. The level of instruction is such that adequate preparation is essential. Common Prerequisites: Chemistry 240, plus either (a) Biochemistry 2000 and 2600 (Biology 2015 and 2012) or (b) Biology 2020 and 2110.

3200A (Biology 3012A) Introduction to Biological Chemistry: lecture 3 hours, lab 3 hours, A.H. Blair, J.A. Verpoorte, C. Mezei, L.C. Stewart. Prerequisites: see above. This class deals with chemical principles governing biochemical systems. We discuss the factors that determine how readily a given metabolic reaction proceeds and describe how these factors may be expressed quantitatively. This is followed by a discussion of basic principles governing the structure of proteins. We also deal with the ways in which proteins bind other molecules, often with high affinity and specificity. Finally, a discussion of enzyme catalysis emphasizes relationships between macromolecular structure and biochemical function, enabling us to explain the striking effectiveness and high specificity with which these catalytic proteins carry out their functions.

3300B (Biology 3013B) Intermediary Metabolism: lecture 3 hours, W. Kimmins, F.B.St.C. Palmer, lab 3 hours, P.J. Dolphin. Prerequisites: see above. Emphasis is chiefly on metabolic pathways common to all organisms, notably the reductive synthesis and oxidative catabolism of carbohydrates, lipids, and some nitrogen compounds. Other pathways, significant in certain tissues or organisms, are included. Metabolic regulation is surveyed, and factors influencing the rate at which compounds flow through selected pathways are examined. Students learn how pathways are compartmentalized, interrelated, and affected by abiotic chemical changes in the environment. Laboratory exercises demonstrate the strategies and techniques used to study metabolic pathways. Tutorial time is used to solve problems and for student presentations.

3400B (Biology 3014B) Nucleic Acid Biochemistry and Molecular Biology: lecture 2 hours, tutorial 1 hour, M.W. Gray, C.W. Helleiner, R.W. Lee; lab 3 hours, M.J. O'Halloran. Prerequisites: see above. This class focuses on the relationship of structure to function in RNA and DNA. Methods for studying the primary, secondary, and tertiary structures of nucleic acids are explored in lectures and in the laboratory. Enzymic mechanisms for biosynthesis, rearrangement, degradation, and repair of nucleic acid molecules are studied, as are the processes of replication and transcription. In this context, nucleic acid biochemistry is emphasized as a basis for understanding storage and transfer of biological information.

4300 Series: Intermediary Metabolism and Control: These half-credit classes continue the study of metabolism begun in Biochemistry 3300, and introduce also some specialized topics of particular interest. Emphasis is on how metabolic systems are related and how the systems and their relations are controlled. Appraisal of experimental evidence and interpretation of data are stressed.

4300B Metabolic Organization and Regulation: lecture 2 hours, W.C. Breckenridge and F.B. St.C. Palmer. Prerequisites: Biochemistry 3200 and 3300 (Biology 3012 and 3013). A functioning organism must control and integrate its metabolism. In this class, topics include enzyme localization, mitochondrial permeability, modified oxidative cycles, and a detailed consideration of the ways in which flux through metabolic pathways is directed and regulated. Emphasis is placed on interpretation of experimental data and on problem-solving.

4301B Biochemical Communication: Membranes, Neurotransmitters, and Hormones: lecture 2 hours, C. Lazier, F.I. Maclean, and C. Mezei. Prerequisites: Biochemistry 3200, 3300, and 3400 (Biology 3012, 3013, 3014) or equivalent, or special permission of the instructors. First, the class examines evidence for current concepts of membrane structure and assembly. Then several membrane-related phenomena are studied; among others, ways for transporting solutes across membranes, and effects that depend on membrane-associated receptors such as neurotransmission and peptide hormone action. Regulation that does not depend on membranes, such as steroid hormone action, is considered in detail.

4302A Biochemistry of Lipids: lecture 2 hours, F.B. St.C. Palmer and others. Prerequisites: Biochemistry 3200 and 3300 (Biology 3012 and 3013). The chemistry and physics of insoluble lipids in an aqueous environment are explored. Current evidence on the physical state of lipids in organisms is examined, and problems in the interaction of insoluble lipids with soluble and insoluble enzymes are considered. Metabolism of a variety of lipids is studied, especially of those that may have specialized physiological functions, including glycolipids, fatty-acid derivatives like prostaglandins and thromboxanes, steroids, phospholipids, etc.

4303A Biochemical Energetics: lecture 2 hours, F.I. Maclean. Prerequisites: Biochemistry 3200 and 3300 (Biology 3012 and 3013). Approximately equal time is given to the following topics: thermodynamic principles of special importance to biochemistry; fermentations; autotrophy and photosynthesis; oxidative phosphorylations; energy metabolism of protozoa and invertebrates.

***4400 Protein Synthesis and Control Mechanisms:** lecture 2 hours, S.D. Wainwright. Prerequisite: permission of the instructor. The class deals with the cell components and reactions involved in the biosynthesis of proteins, with special reference to mechanisms controlling the rate of synthesis and the spectrum of proteins made. Students' individual study of research reports is emphasized.

4403A & 4404B Molecular Biology of the Gene: These half-credit classes consider the duplication, transfer, and expression of genetic material. The experimental evidence for current concepts of gene structure and function is stressed. Students learn the language of molecular biology and the experimental techniques peculiar to it. Lectures adopt a historical perspective so that students come to appreciate how the discipline of molecular biology has developed.

4403A (Microbiology 4403A) Structure, Organization, and Replication of Genes: lecture 2 hours, M.W. Gray, and S.D. Wainwright. Prerequisite: Biochemistry 3400 (Biology 3014). Topics include basic molecular genetics; evaluation of genetic complexity and gene arrangement; chromosome structure; identification and enumeration of specific genes; mechanisms of replication, recombination, and repair, and manipulation of genes *in vivo* and *in vitro* ("genetic engineering").

4404B (Microbiology 4404B) Gene Expression: lecture 2 hours, W.F. Doolittle, R.A. Singer. Prerequisite: ordinarily, Biochemistry 4403A (Microbiology 4403A). Topics include relationship between gene structure and function; RNA transcription and processing; the genetic code and translation of messenger RNA; and regulation of protein synthesis.

Appropriate prokaryotes, eukaryotes, and viruses that illustrate different modes of gene expression are dealt with.

4602 Honours Project & Thesis: lab 6 hours, J.A. Verpoorte. Students undertake a small research project supervised by a Faculty member, and present a written report.

4700A Proteins: lecture 2 hours, tutorial 1 hour, J.A. Verpoorte. Prerequisites: Biochemistry 3200 (Biology 3012) plus a basic class in physical chemistry or permission of the instructor. Selected aspects of the chemistry of proteins are considered. Topics include discussions of relationships of structure to bioactivity, the forces that stabilize protein structure, and chemical and physical methods used to isolate and study proteins and other macromolecules.

4701B Enzymes: lecture 2 hours, A.H. Blair. Prerequisite: Biochemistry 3200 (Biology 3012). Our current understanding of enzymic catalysis and its experimental basis are examined. The relationship between structures of catalytic and regulatory sites and their functions are considered for selected enzymes. The kinetics of enzyme-catalysed reactions are studied, as is the way in which binding of regulatory molecules influences kinetic behaviour and thereby regulates cellular metabolism.

***4800 (Pathology 501) Clinical Medical Biochemistry:** lecture 2 hours, lab 3 hours, Pathology faculty members. Prerequisite: Biochemistry 3200 (Biology 3012). Examines the application of chemical concepts and techniques to the prevention, detection, diagnosis, understanding, and treatment of diseases.

4801 (Biology 4401) Introduction to Pharmacology: lecture 2 hours, lab 3 hours, H.A. Robertson (Pharmacology). Prerequisite: permission of coordinator. Described under Biology 4401.

***4802 (Pathology 503) Principles of Instrumentation:** lecture 3 hours, lab 4 projects, Pathology faculty members. Prerequisite: Biochemistry 3200 (Biology 3012). Examines the theory and practice of a wide range of modern instrumental techniques for clinical biochemical analysis.

8880 Honours Qualifying Examination: Honours students must fulfil the requirements of this class (see 11.3, page 24) by presenting oral Progress and Final Reports on their work in Biochemistry 4602 at special Departmental seminars.

Biology

Chairperson of Department

B.K. Hall

Professor Emeritus

D. Pelluet, MA (Toronto), PhD (Bryn Mawr), LLD (Hon. Dal)

Professors

R.G.S. Bidwell, MA, PhD (Queens), FRSC — Killam Research Professor

R.G. Brown, MSc (McG), PhD (Rutgers)

M.L. Cameron, MSc (Dal), PhD (Cantab.)

A.R.O. Chapman, PhD (Liv.)

R.W. Doyle, MSc (Dal), PhD (Yale)

J. Farley, MSc (W.Ont.), PhD (Man.)

J.C. Fentress, BA (Amherst), PhD (Cantab.) — (Psychology)

E.T. Garside, MA, PhD (Tor.)

L.E. Haley, MSA (Tor.), PhD (Calif.)

B.K. Hall, PhD, DSc (UNE)

O.P. Kamra, MS (N.Car.State), PhD (Wash. State)

W.C. Kimmins, PhD (Lond.)

P.A. Lane MSc (SUNY Binghamton), PhD (SUNY Albany)

K.E. von Maltzahn, MS, PhD, (Yale) — Carnegie Professor, King's

I.A. McLaren, MSc, (McG), PhD (Yale) — George S. Campbell Professor

E.L. Mills, MS, PhD (Yale) — (Oceanography)

R.K. O'Dor, AB (Berkeley), PhD (UBC)

J.G. Ogden, III, MA (Tenn.), PhD (Yale)

L.C. Vining, MSc (Auck.), PhD (Cantab.), FRSC

E. Zouros, MSc PhD (Agri. Coll. Athens), PhD (Chic.)

Associate Professors

E.W. Angelopoulos, MS, PhD (Minn.)

B. Freedman, MSc, PhD (Tor)

A.J. Hanson, MSc (UBC), PhD (U. Mich.) IES

M.J. Harvey, PhD (Dunelm)

G.S. Hicks, MSc (Carl.), PhD (Sask.)

R.W. Lee, MA (Mass.), PhD (SUNY Stony Brook)

R.P. McBride, MSc (UBC), PhD (Edin.)

R.G.L. McCready, MSc (Alta.), PhD (Calg.)

J.A. Novitsky, BSc (Penn. St.), PhD (Ore. S.U.)

D.G. Patriquin, MSc, PhD (McG)

M. Schrempf, PhD (Stuttgart-Hohenheim)

J.H.M. Willison, PhD (Nottingham)

Associate Professor (Research)

G.F. Newkirk, PhD (Duke)

Assistant Professors

R.G. Boutilier, MSc (Acadia), PhD (East Anglia)

T.H. MacRae, MSc, PhD (Windsor)

M.R. Rose, MSc (Queens), PhD (Sussex)

R.E. Scheibling, PhD (McG)

Adjunct Professors

D. Brewer, BSc (Durham), MSc, PhD (Tor.), Atl. Reg. Lab, NRC

J.D. Castell, MSc (Dal), PhD (Oregon St.), Fish. & Mar. Serv.

J.S. Craigie, MSc, PhD (Queens), Atl. Reg. Lab, NRC

K.H. Mann, PhD (Reading), DSc (Lond.), FRSC Mar. Ecol. Lab, BIO

J.L. McLachlan, BSc, MA, PhD (Oregon State College), Atl. Reg. Lab, NRC

Honorary Research Associates

D.M. Anderson, MSc (Man.), PhD (Sask.), N.S. Agric. Coll.

J. Bubar, BSc (Macdonald College, McG), MS (Penn St.), PhD (McG), N.S. Agric. Coll.

L. Cock, BSc (McG), MS (Wis.), PhD (Maine), N.S. Agric. Coll.

D.K. Cone, MSc (Guelph), PhD (UNB), St. Mary's Univ.

R. Conover, PhD (Yale), Mar. Ecol. Lab, BIO

D.C. Crober, MSc (Macdonald College, McG), PhD (UBC), N.S. Agric. Coll.

J. Fraser, BSc (Bedford College, London Univ.), MSc (Aberdeen), PhD

(Lincoln College, Univ. of Canterbury), N.S. Agric. Coll.

T. Ghose, MB, BSc, PhD (Calc.), MRC Path. Dept. of Pathology, Dalhousie

B.T. Hargrave, MSc (Dal), PhD (UBC), Mar. Ecol. Lab, Fisheries and

Environment

F.H. Harrington, BA Hons. (Delaware), PhD (New York at Stony Brook),

Mount Saint Vincent University

W.G. Harrison, BSc, PhD (North Carolina, Raleigh), Mar. Ecol. Lab, BIO.

J.J. Kerekes, BSc (UBC), MSc (Alberta), PhD (Dal), Canadian Wildlife Environment Canada

S.R. Kerr, BSc (Carleton), MSc (Queens), PhD (Cal.), Mar. Ecol. Lab, BIO

J.R. Long, Dip. Agric. (N.S. Agric. Coll.), DVM (Tor.), MS (Cornell), PhD

(Guelph), N.S. Agric. Coll.

W.S.G. Maass, Dr. rer. nat. (Tubingen), Atl. Res. Lab, NRC.
 I.A. Meinertzhagen, BSc (Aberdeen), PhD (St. Andrews), Psychology Dept.,
 Dalhousie
 T.C. Platt, BSc (Nottingham), MA (Tor.), PhD (Dal), Mar. Ecol. Lab, BIO
 R.K. Prange, BSc (Acadia), MSc (UBC), PhD (Guelph), N.S. Agric. Coll.
 J.D. Pringle, MSc (Victoria), PhD (Dal), Fisheries and Oceans.
 A.R. Robinson, MSc, PhD (Macdonald College, McG), N.S. Agric. Coll.
 G.W. Stratton, MSc, PhD (Guelph), N.S. Agric. Coll.
 J.P. van der Meer, BSc Hons. (W. Ont.), PhD (Cornell), Atl. Res. Lab, NRC
 R.J. Wassersug, BSc (Tufts), PhD (Chic.), Dept. of Anatomy, Dalhousie.

Senior Instructors

P. Gerdes, BSc (McG), MSc (U.W.O.)
 P. Harding, BA (Tor.), MSc (Dal)
 C. Knight, BSc, BEd, MSc (Dal)
 M.J. O'Halloran, BSc (South), BEd (Dal)

Instructors

C. Beauchamp, BSc, MSc (Memorial)
 J. Breckenridge, BSc (Queen's)
 T. Gallivan, MSc (Dal)
 A. Mills
 E. Staples, BSc (Dal)
 P. Young, BSc (Dal)

Postdoctoral Fellows

R.K. Bhatnagar, PhD (Delhi)
 P.G. Daye, BSc (UNB), MSc, PhD (Dal)
 P. Dyson, PhD (Glasgow)
 G. Jones, PhD (Wales)
 P. Service, PhD (No. Car.)
 D. Williams, PhD (Surrey)

The program offered by the department gives a basic training in the biological sciences which may serve as a preparation for graduate and professional work in biology, medicine, dentistry, pharmacy, the health professions, bio-engineering and education, agriculture, marine sciences, fisheries, aquaculture, forestry and environmental architecture and engineering.

Degree Programs

The department offers classes leading to the BA and BSc degrees, to concentrated or combined Honours BSc and BA programs and a BSc Honours in Marine Biology program. A student intending to study biology as his main subject should consult the department early in his course so that a proper program can be worked out.

Areas of Specialization —Major and Honours

Many classes are available to students wishing to concentrate their studies in particular areas of biology. In some cases, the order in which classes are taken is important, but cannot be rigidly specified here because students may vary widely in their interests and requirements. For this reason, students are strongly urged to consult with an adviser in the biology department, whether they are planning a 3-year, 2-year or only 1-year program in biology. Faculty advisers are available in the following fields (among others): Molecular Biology, W.C. Kimmins, L.C. Vining; Microbiology, R.G. Brown, J. Novitsky; Genetics, R.W. Doyle, R.W. Lee, L.E. Haley, O.P. Kamra, E. Zouros; Ecology/Environmental Studies, R.W. Doyle, B. Freedman, P. Lane, I. McLaren, J.G. Ogden; Physiological/Cell Biology, M.L. Cameron, T. MacRae, R.K. O'Dor, D. Patriquin, M. Willison; Developmental Biology, B.K. Hall, G.S. Hicks; General Studies, J. Farley, R.P. McBride, K.E. von Maltzahn; Plant Biology, M.J. Harvey, A.R.O. Chapman, M. Willison; Animal Biology, E.T. Garside; Entomology & Parasitology, E. Angelopoulos.

Honours in Biology

For entrance to graduate school an honours degree or equivalent four-year background is required. Some graduate schools require a reading knowledge of French, German or Russian. A thorough grounding in mathematics and physical sciences is as important as advanced undergraduate training in biology.

Students reading for Bachelors degrees with honours in biology must satisfy the general requirements for honours degrees (see general faculty regulations, page 22, referring to academic programs) and must arrange their course programs as early as possible in consultation with the department. In the fourth year a program will normally include Biology 4900. Normally all honours students in Biology must complete Biology 2015, 2046, 2030 and 2050 or their equivalents by the end of the third year. Students must attain a B grade average in these classes, with no mark lower than a B-.

Selecting an Honours Program

The basic Biology Honours Program provides a broad background in the biological sciences and enough flexibility to allow some degree of specialization in a variety of sub-disciplines. A suitable program of this kind (e.g. cellular and developmental biology, cellular biology and genetics, ecology and evolution, environmental biology, molecular biology, human biology, etc.) worked out with an adviser and leading to a thesis in that area is excellent preparation for advanced studies.

Some students may wish to choose a Combined Honours Program with Biochemistry, Chemistry, Economics, Geology, Mathematics, Psychology or Physics. These programs must be worked out with the two departments. Special combined programs exist with some departments. A program with Economics is particularly applicable to students with an interest in ecology. Students interested in such a program should take Biology 1000 and Economics 1100 in their first year, and contact R. Doyle as faculty advisor.

The departments of Biology and Microbiology offer both an Honours and a 2-year coordinated program in Microbiology. These programs are designed for students entering their second year of study. Students interested in these programs are advised to consult either of the departments concerned at their earliest opportunity. Faculty advisors are R.G. Brown (Biology) and D.B. Stoltz (Microbiology). Note that classes that are cross listed between these two departments can be taken for either Microbiology or Biology credits.

Students may be interested in programs that are not oriented toward a traditional discipline but rather emphasize a broad knowledge. For them, an Unconcentrated Honours Program may offer the best preparation. Advice on these matters may be obtained in the department.

Honours in Marine Biology

The Biology Department recognizes the special needs of the rapidly expanding marine field and offers a BSc Honours Degree in Marine Biology.

Details of the program will be found under a separate listing for Marine Biology.

Classes Offered

Major and Honours Program

Please note that except in very special cases Biology 1000 is the prerequisite for all other classes in the biology department.

A class number that is suffixed by one of the letters A, B, or C is a half-credit class. See comments on these classes under the heading Numbering of Classes under General Undergraduate Information and Regulations.

Biology classes may be grouped into four general types:

1. **Introductory Biology Principles:** Biology 1000. This class is designed as an introductory university-level class in biology for the student who has no previous training in the subject as well as for those who have taken high school biology. It is required for entrance to all other classes in the department.

2. Intermediate Classes-2000-Level Classes: The study of life (Biology) occurs on several levels. Our everyday experience with life is with units called organisms which come in an amazing variety of forms including dogs and trees and even ourselves. All of these forms are composed of cooperating cells, and many of the activities of cells are now understood at a molecular level. The diversity of life results from interactions among organisms and populations of organisms as well as interactions with the environment. Understanding any problem in Biology requires knowledge of all of these levels of interaction. The class requirements in the Department are designed to insure that every Biology student takes at least one intermediate class at each level of organization. Some of the major themes of Biology transcend all three levels, and it is also important that each student be exposed to at least one of these integrative themes, thus these make up the fourth category, Biological Processes. *All students registered in Biology are required to take at least one-half credit class in each of the four categories below.*

The full credit equivalent classes may be required as prerequisites for advanced classes in a particular area. Students should be aware of such prerequisites and discuss their programs with their faculty advisor to insure that the classes they take are appropriate to their goals. Good performance in a half-credit equivalent is usually acceptable as a prerequisite for an advanced class with the instructor's permission.

Category I: Cells and Molecules; Biology 2015R, 2110A/B, 2020B.

Category II: Organisms; Biology 2001A, 2002B, 2100A/B

Category III: Populations and Ecosystems; Biology 2046R, 2060A/B, 2066A/B.

Category IV: Biological Processes; Biology 2030A/B, 2040A/B, 2050A/B. Students may not take more than one full credit in Categories I and III. Biology 2012A or B is a half-credit class which is not a member of the core thus cannot be counted toward fulfilling the core requirement.

3. 3000-Level Classes: These classes are mainly for second and third year students. No biology major will be allowed to register in any 3000 or 4000-level class without having completed, or being registered in 2000-level classes in biology totalling at least two full credits.

4. 4000-Level Classes: These classes are primarily for honours and graduate students. They are open to others with the permission of the instructor. Where biology classes are identified as being given in another department (e.g. Anatomy), that department should be consulted for details.

Introductory and Intermediate Classes Offered

1000 Principles of General Biology: study centre 3 hours, tutorial quiz 1 hour/2 weeks, lecture assembly 1 hour, I. McLaren, M.L. Cameron, L.C. Vining; Instructors, T.M. Gallivan, A.H. Mills. Biology 1000 is given in an audio-tutorial format with the study centre open on a come-any-time basis from 9:00 a.m. to 9:30 p.m. The subject matter puts emphasis on those features common to all organisms. The class starts by considering the basic functions of whole organisms by studying a typical plant and a typical animal. Then the organism is examined in finer detail, considering the structure of cells, cell chemistry, energy needs, the coding system and protein synthesis. This leads to the topics of genetics, evolution, ecology, development and systematics in the second term. Biology 1000 is the basic introductory class in biology. It is suitable for students who may have had no previous training in biology. *If you are a biology major Biology 1000 is the prerequisite for all other classes in the biology department, regardless of previous backgrounds in biology.* Under exceptional circumstances, students may apply to be exempted from taking Biology 1000.

1984 A Citizens Guide to the Biological Issues of our Times: lecture 2 hours, tutorial 1 hour, R.P. McBride. For BA students only and cannot be used as a prerequisite for other biology classes. An awareness and comprehension of major developments in biology sufficient for citizen involve-

ment in science-society controversies. Studying topics with major social impact such as genetic engineering, environmental health hazards and modern agriculture, students acquire a scientific vocabulary, insight into the strengths and limitations of science, and an understanding of basic biological concepts.

2001A Marine Diversity: lecture 2 hours, tutorial 1 hour, lab 3 hours, R.K. O'Dor, D.G. Patriquin, A.R.O. Chapman. Instructor, P. Harding (Category II). The sea was the cradle of life and the origin of most phyla. This class explores the enormous variety of living and fossil organisms from the sea and looks at the special problems and adaptations of benthic, planktonic and nektonic species. It examines functional and taxonomic relationships using lectures, laboratories with living organisms, field trips and computer and A-V aided learning.

2002B Terrestrial Diversity: lecture 2 hours, tutorial 1 hour, lab 3 hours, D.G. Patriquin, R.K. O'Dor, Instructor, P. Harding (Category II). Prerequisite: Biology 2001A. A survey of the terrestrial organisms. The class emphasizes the restrictions imposed on terrestrial adaptations by the aquatic origins of the colonizers, discusses the physiology of living in a terrestrial environment, and finally looks at the domestication of plants and animals by man and speculates on the future diversification of the earth environment and its inhabitants.

2012A/B Laboratory Techniques for Cell and Molecular Biology: lecture 1 hour, tutorial 1 hour, lab 3 hours, W.C. Kimmins. Instructors, P. Gerdes. An introduction to techniques, equipment and the experimental approach to solving biological problems in the laboratory. Lectures present the theoretical background to laboratory experimentation. Tutorials aim mainly at developing an appreciation of experimental design and data analysis. Students intending to take more advanced biochemistry/molecular biology classes next year need this class and Biology 2015 as prerequisites. Biology 2012A/B can be used as a credit toward a major or honours but does not meet the requirement of a class in Category I.

2015R Cell Biology and Biochemistry: lecture 3 hours, tutorial 1 hour, W.C. Kimmins, T. MacRae, J.H.M. Willison (Biology); W.F. Doolittle, R.G. Fenwick, C.W. Helleiner, D.W. Russell, R.A. Singer (Biochemistry). Instructor, P. Gerdes (Category I). Members of the Biochemistry and Biology Department join in offering this introductory class which explores the full range of contemporary ideas in cell and molecular biology. The class deals with topics such as the transmission of genetic information, gene expression, growth, adaptation, cell division and differentiation at a mechanistic level and provides a broad perspective of metabolic processes associated with energy production, biosynthesis, transport and communication. It also seeks to explain the integration of these and other forms of biological activity through regulation of gene expression and the diverse cellular and metabolic control systems. Students who intend to take more advanced biochemistry and molecular biology classes next year need this class and Biology 2012A/B as prerequisites. Biology 2015R and 2012A/B may be substituted for Biology 2020 and/or 2110 as prerequisites, but credit may not be given for both 2015 and either 2110 or 2020.

2020A Cell Biology: Structure and Function: lecture 3 hours, lab 3 hours, T. MacRae. Instructor, P. Gerdes (Category 1). Prerequisite: High school chemistry. An introduction to the eukaryotic cell through lectures and laboratories. Major cell components and activities are described at ultra-structural and molecular levels. The concept of the cell as an integrated structural/-functional unit is developed. Credit will not be given for both Biology 2020 and 2015.

2030A/B Genetics: lecture 3 hours, tutorial 1 hour/2 weeks, L.E. Haley, O.P. Kamra, R.W. Lee. Instructor, E. Staples (Category IV). This class examines a broad range of topics from the rapidly expanding field of genetics.

Major organizational sections include: Chemical and structural features of genes and chromosomes, gene transmission, gene function and gene variation in populations and through time. Tutorials deal mainly with problem solving. All students must do a laboratory project involving *Drosophila* crosses.

2040B Evolutionary Biology: lecture 3 hours, tutorial 1 hour, lab open. E. Zouros, Instructor, C. Beauchamp (Category IV). Prerequisite: High school algebra. Lectures cover the following topics, with about equal time devoted to each: origin of life and the evolution of the eukaryotic cell; evidence for evolution and major evolutionary theories; mechanism of evolution with emphasis on natural selection; the evolution of populations and the origin of species; patterns in the fossil record; human evolution. A textbook and a collection of papers (about four papers per topic) supplement the lectures. The mathematical theory of evolutionary biology is studied in tutorials, which consist of a set of problems covering elements of population genetics and statistics.

2046 General Ecology: lecture 2 hours, lab/tutorial 3 hours, R.W. Doyle. Instructor, C. Beauchamp (Category III). Credit will not be given for both 2046 and either 2060 or 2066. The growth and regulation of population size, the genetic structure of populations and the ecological structure of plant and animal communities. Principles which apply on a short (ecological) time scale will be developed in parallel with the analogous principles which apply over much longer stretches of evolutionary time. Much of the laboratory and about one-quarter of the lectures are concerned with applied ecology; in particular, with the biological basis of fisheries and environmental management. This full year class provides a good foundation for further work in ecology and marine biology.

2050A/B Developmental Biology: lecture/discussion 3 hours, lab 2½ hours, G.S. Hicks, B.K. Hall, J.H.M. Willison, P. Young (Category IV). The lectures describe development as a sequence of programmed events, in which 'simple' structures such as the fertilized egg are progressively transformed into complex organisms. These events are governed by a set of developmental 'rules.' Our knowledge of these rules comes from experimental study of a variety of developing systems such as sea urchins, frogs, chick embryos and humans. Importantly the rules will be discussed in relation to several contemporary 'social concerns' such as human test tube fertilization, cloning, cancer and gene engineering. Laboratories stress the use of live material and give students practice with such techniques as test tube fertilization in echinoderms and tissue culture.

2060A Introductory Ecology: lecture 3 hours, lab 3 hours, B. Freedman. Instructor, C. Knight (Category III). Ecology is the study of the interrelationships of organisms and their environments. The broad subject of ecology focuses upon the interactions of plants and animals with each other and with their non-living world. Three levels of ecology are studied: (1) individuals, (2) Populations, and (3) Communities and Ecosystems. Labs and tutorials enlarge upon concepts presented in lecture. Students are instructed in elementary computer techniques and use the computer for some laboratories. This class provides a good foundation for further work in ecology and marine biology. Credit will not be given for both Biology 2060 and either 2046 or 2066.

2066B Human Ecology: lecture 2 hours, lab 2 hours, tutorial 1 hour, alternate weeks, P.A. Lane. Instructor, C.A. Knight (Category III). This class examines the principles of ecology with a focus on humans as a part of nature. Lectures will begin with an examination of how individuals are morphologically, physiologically and genetically adapted to their environment. Sociobiology and its ramifications for human behaviour will also be discussed. From the ecology of individuals, the topics will advance to an appreciation of population ecology. The importance of agricultural crops and renewable resources to the growth and regulation of human populations will

be examined to develop an understanding of worldwide demography. Pests are major competitors while disease pathogens are the main predators of humans. These types of species interactions will be studied. Communities and ecosystems form a higher level of ecological organization and these levels will be studied in the second part of the class. How humans have polluted their environment will conclude the class. In the laboratory, students will begin from basic principles to learn how mathematical/statistical techniques and the computer can be useful to ecologists. Variability among individuals, population growth, and modelling of whole ecosystems are examples of exercises that will be presented in the laboratory. Students will attend a tutorial alternate weeks. The tutorial will relate the applied laboratory exercises to the lecture topics by discussing current papers in the ecological literature. These may include areas such as climatic adaptation, IQ testing, epidemiology, the dilemma of world population growth, building models of human ecosystems, resource management and pollution control. Credit will not be given for both Biology 2066 and either 2046 or 2060.

2100A/B Introductory Microbiology: lecture 2 hours, lab 3 hours, D.B. Stolz (course co-ordinator), R.G. Brown, G.C. Johnston, J. Novitsky. Instructor, J. Breckenridge (Category II). An introduction to the basic concepts of microbiology through lectures, laboratory sessions, demonstrations and films. Subjects include the uniqueness of microorganisms, their structure, growth and genetic regulation, as well as their involvement in other fields such as medicine, industry and ecology.

2110B Biochemistry and Physiology of Microorganisms: lecture 3 hours, lab 3 hours. L.B. Vining. Instructor, B. Hill (Category I). An introduction to the organization and function of microorganisms. This class complements Biology 2100 in dealing with broad aspects of growth and metabolism, energy transfer, transmission and expression of genetic information, and cell structure in microorganisms at a biochemical level. It aims to develop an integrated understanding of biological activity in the microbial world and its relationships to other life processes. The class is oriented towards students interested in microbiology and offers a suitable preparation for 3000-level classes in that subject. However, if taken with Biology 2020A it also satisfies the prerequisites for 3000-level biochemistry/molecular biology classes. Students taking Biology 2110 may not also take Biology 2015 or Biology 2012.

Advanced Classes

These classes are for second, third and fourth-year students. They may be taken before completion of the intermediate classes described above. Please notice, however, prerequisites for the classes listed below. Students registering for these classes will have completed, or be registered in, a minimum of 2 full credits at the 2000-level.

Classes marked with an asterisk (*) are offered in alternate years. Consult timetable for current year.

3012A (Biochemistry 3200A) Introduction to Biological Chemistry: lecture 2 hours, D.W. Russell; tutorial ½ hour, various Biology and Biochemistry staff; lab 3 hours, C. Mezei. Prerequisites: Biology 2015 (Biochemistry 2000), Biology 2012A/B (Biochemistry 2600A/B) and Chemistry 240 or their equivalent(s). This class is described under Biochemistry 3200A. Major and honours biology students do not require this class as compulsory prerequisite to Biology 3013B or 3014B.

3013B (Biochemistry 3300B) Intermediary Metabolism: lecture 2 hours, tutorial 1 hour, W. Kimmins, F.B. Palmer; lab 3 hours, P. Dolphin. This class is described under Biochemistry 3300B.

3014B (Biochemistry 3400B) Nucleic Acid Biochemistry and Molecular Biology: lecture 2 hours, tutorial 1 hour, M.W. Gray, C.W. Helleiner and Biology Faculty; lab 3 hours M.J. O'Halloran. This class is described under Biochemistry 3400B.

3020A Advanced Cell Biology I: lecture 3 hours, T.H. MacRae. Prerequisite: 2020A or 2015R or permission of the instructor. Molecular and organelle aspects of cytoplasmic organization in eukaryotic cells are examined. A number of interrelated topics are discussed providing an opportunity to study new concepts in cell biology and to evaluate established ideas in the context of recent findings. Students must supplement lectures with assigned readings and discuss selected subjects in essays.

Biology 3021B, Advanced Cell Biology II (Cell Structure & Function): 3 lectures per week, 2 weeks in which a lab session is held. Prerequisites: 2020A or 2015R. The class examines eukaryotic cell structure, relating structure to physiological function in diverse systems. Emphasis is placed upon structures visible in the electron microscopes, and upon structural aspects of the integration of activities within cells, and between cells in tissues. Laboratory sessions will be held irregularly and are concerned with interpretation of microscopic images.

3030B Advanced Genetics: lecture 2 hours, tutorial 1 hour, lab 3 hours, L.E. Haley. Prerequisite: Biology 2030A/B. The topics introduced in biology 2030A/B are dealt with in much greater detail with emphasis on the genetics of different organisms and the analysis of genetic crosses.

3031A Molecular Genetics of Eukaryotes: lecture 3 hours, R.W. Lee. Prerequisites: Biology 2015 or 2110A/B and 2030A/B. This class evaluates current knowledge about the molecular organization of eukaryotic genomes, with emphasis on the possible evolutionary and functional meaning of this organization and on modern experimental approaches.

***3032B Cytogenetics:** lecture 2 hours, lab 3 hours, O.P. Kamra. Prerequisites: 2030A or B, and Biology 2020A or Biology 2015. Detailed consideration of certain genetical and cytological mechanisms in relation to chromosomal modifications, gene mutations and evolution.

3033A Microbial Genetics: (Microbiology Dept.).

***3034B Biological Effects of Radiation:** lecture 2 hours, lab 3 hours, O.P. Kamra. A survey of current knowledge of the effects of ionizing radiation on biological material on three levels: physical, chemical and biological. In addition, methods of dosimetry, autoradiography, somatic and genetic effects, radiomimetic chemicals and biolasers are discussed.

3035A Population and Quantitative Genetics: lecture 2 hours, tutorial 1 hour, E. Zouros. Prerequisites: Biology 2030 or Biology 2040 or Biology 2046; Math 1000 and Math 1060 or permission of the instructor. The following topics are covered: amounts and kinds of genetic variation in populations; genetic properties of populations, causes of evolution with emphasis on natural selection; genetic differentiation of populations. Data from actual research provides the material for exercises. Students doing research in genetics are encouraged to bring into class the results of their own research. A statistical analysis of such data may serve as a partial fulfillment of the requirements of the class.

3039A Human Genetics: lecture 3 hours, lab 3 hours, O.P. Kamra and E. Zouros. Prerequisite: Biology 2030A or B. For students of Biology and Medicine with special interest in human genetics. Topics include human cytogenetics and abnormalities, inborn errors, genetic risk induced by environmental factors; prediction and detection of genetic risk, genetic counselling; genetic and non-genetic factors in behavioural characters and multifactorial diseases; genetic variability; selection and genetic load in human populations; ethical and social issues associated with manipulation of human genetic pools. A background in basic genetics is assumed.

3051B Advanced Development: lecture 2 hours, lab 3 hours, G.S. Hicks, B.K. Hall. Instructor, P. Young. Prerequisite: 2050A or B. With reference to model experimental organisms now in use, the following subjects are

reviewed critically: sex determination and human sexual development, cancer, aging, teratogenesis, epithelial-mesenchymal interactions, organogenesis, totipotency, applied development. Laboratories consist of two projects in which students learn a variety of techniques such as: culture of animal embryonic organs; preparation and analysis of histological sections; photographic techniques; plant tissue culture. Such exercises are beneficial to students going on to both professional and non-professional vocations including medicine, laboratory technology and teaching.

3061B Communities and Ecosystems: lecture 2 hours, tutorial 1 hour, lab 3 hours, P.A. Lane, C.A. Knight. Prerequisite: Biology 2046, 2066 or 2060A. Major concepts and recent advances in community-ecosystem ecology are stressed; size-spectrum theory, evolutionary strategies of organisms and a delineation of contemporary ecosystem problems, especially those pertinent to the area of environmental impact assessment. The focus is on aquatic ecosystems — both freshwater and marine — and their major features are compared. The evolutionary strategies of plankton, fish predation models, and community descriptions are discussed in the first half of the term. Students also are given practical laboratory experience in associated methodologies. In the second part of the term, three major approaches to ecosystem analysis are compared. The laboratory parallels the lectures and gives experience in analyzing ecosystem data and applying theoretical techniques. In the tutorials, broader issues of environmental ecology will be presented by the students.

3062B Behavioral Ecology: lecture 2 hours, tutorial 1 hour, M.R. Rose, J.C. Fentress. Prerequisites: Biology 2046 or 2060/2040 (Biology majors); Psychology 200 (Psychology majors). The class is divided into three sections: (A) Background-selection and behaviour: natural selection, group selection, kin selection; (B) Methods-general methodological problems, ultimate, mediate, and proximate causation, the comparative method, optimality theory, strategy polymorphism; (C) Modes of behaviour — gathering food, living in groups, intraspecific conflict, sex, parental care and development, cooperation, communication, coevolution, sapience.

3066A Plant Ecology: lecture 2 hours, lab 3 hours, one/two field trips on weekends, B. Freedman. Prerequisite: Biology 2046 or 2060. Various topics within the field of Plant Ecology are discussed. At the ecosystem level, we deal in depth with the cycling of energy and significant nutrients, and with successional changes in these processes. At the autecological level we deal with plant population biology and demography, resource allocation, and physiological ecology. The plant environment is also described in terms of energy budgets, soils, and water availability.

3067A A Survey of Fish Biology: lecture 2 hours, seminar 1 hour, R.G. Boutilier, R.W. Doyle, R.K. O'Dor. Prerequisites: Biology 2046 or 2060, Biology 2015 or 2020. The topics covered include fish systematics, physiology, behaviour and ecology. The primary purpose is to prepare students for Honours research projects in fish biology and to provide the background necessary for entry to 4th-year courses such as Fisheries Population Biology, and Fisheries Oceanography. Although no laboratory is scheduled, practical and library research projects are required.

3069A Animal Population Ecology: lecture/tutorial 2 hours, lab 3 hours, I.A. McLaren. Prerequisites: Biology 2046 or 2060, Math 1000, 1010, 1060. Population ecology of a representative species is used to exemplify various demographic tactics and situations: a marine copepod for links with physiological ecology; an "out-break" insect for density-independence and questions of control; a passerine bird for density-independence and the adaptedness of demographic parameters; lemmings for cycles and "self-regulation" hypotheses; eastern Canadian seals for problems of management and control of long-lived species; cranes and condors for the demography of threatened species. The demography of "model" species is explored in the (open) lab sessions.

3070 Principles of Animal Physiology: lecture 2 hours, discussion 1 hour, lab 3 hours, R.G. Boutilier, R.K. O'Dor; Instructor M.J. O'Halloran. Prerequisites: Biology 2001 and 2020 or 2015 (in which a minimum C grade is required). A discussion of the mechanisms which coordinate the activities of cells within multi-cellular organisms and permit such organisms to maintain a stable internal environment in a changing external environment. The emphasis is on the mechanisms most widely distributed through the animal kingdom. The laboratories are designed to illustrate these "principles of physiology" in a variety of organisms and to demonstrate the experimental approaches used to study physiology.

3071 Physiology of Marine Animals: lecture 2 hours, discussion 1 hour, lab 3 hours, R.K. O'Dor, R.G. Boutilier, Instructor, M.J. O'Halloran. Same prerequisites as 3070. Credit may not be given for both 3070 and 3071. The problems of animals in a marine environment are quite different from those found in air or fresh water, but the "physiological principles" are similar. This class deals with the same principles as 3070, but emphasizes the special characteristics of marine animals in the laboratory and the techniques necessary to study them.

***3073B Plant Physiology:** lecture 2 hours, lab 3 hours, D.G. Patriquin. Prerequisite: Biology 2110 or 2015 or 2020 or permission of instructor. Topics include water relations, photosynthesis, respiration, nitrogen metabolism, transport, translocation, and some aspects of plant development, crop physiology and productivity.

***3075A Plant-Soil Relationships:** lecture 2 hours, lab 3 hours, D.G. Patriquin. This class deals with processes that are involved in the exchange of materials between plants and soils, and that limit plant growth under field conditions. The emphasis is on cultivated plants, but the material is relevant to natural systems, and reference is made to aquatic angiosperms and sediments. Topics include soil formation, soil aeration and root metabolism, water relationships, mineralization and humification of organic matter, plant mineral nutrition and ion uptake, fertilizers, saline soils and halophytic angiosperms, and plant-microbe interactions. Laboratory sessions deal with the design of field and greenhouse experiments and with the methodology of measuring the various properties and processes discussed in class.

3100B Aquatic Microbiology: lecture 2 hours, lab 3 hours, R.G. Brown, J. Novitsky. Previous knowledge of microbiology is not necessary for this class; however, enrolment is limited to students in the Marine Biology Honours Program. The main emphasis of this class is on the interactions of microbes and aquatic plants and animals including nutrition, disease, and immunization. The latter part of the class considers the role of microorganisms in nutrient availability and productivity in aquatic environments.

***3111B Microbial Activities in Nature:** lecture 2 hours, lab 3 hours, R. Brown. Prerequisites: Biology 2100A/B and Chemistry 240 or Biology 2110 or 2015. The format is lectures and laboratory exercises. Microorganisms play a far more important role in nature than their small size would suggest. To illustrate this, the following topics are considered at the cellular and molecular levels: epiphytic microorganisms of plants and animals. Koch's postulates, protective mechanisms of plants and animals, the function of microbes in ruminants and the rhizosphere, nitrogen fixation and the mineralization of organic matter including petroleum.

3114A Introduction to Virology: (Microbiology Dept.).

3115A Introduction to Immunology: (Microbiology Dept.).

***3116 Mycology:** D. Brewer. Prerequisite: Biology 2100A or B. An introduction to the morphology and taxonomy of the fungi.

3117A Yeasts and Fungi: R. Brown. Prerequisite: Biology 2100A or B. An introduction to the biology of yeasts and fungi with emphasis on the structure and function of the cell wall and membrane, control of cell metabolism, and the cell cycle.

3118B Systematic Bacteriology: (Microbiology Dept.).

3120B Advanced General Microbiology: lecture 2 hours, lab 4 hours, J. Novitsky. Prerequisite: Grade B or better in Biology 2100A/B. For students interested in increasing their knowledge and skills in microbiology beyond the introductory level. This class provides excellent background for students continuing in microbiology or entering employment where skills in handling microbes are required. Topics include microbial metabolism, growth, structure, genetics, taxonomy, symbioses, pathogenesis, the environmental effects on microbial activity, and an introduction to soil, food, aquatic, applied, and industrial microbiology. The laboratory stresses basic techniques in microbiology with a strong emphasis on individual students' skills.

3150A Applied Microbiology: lecture 2 hours, lab/tutorials 3 hours, L.C. Vining. Prerequisite: Biology (Microbiology) 2100A/B and 2110B. For students who wish to broaden their interests in microbiology as well as for those with a particular interest in the applications of microbiology as a career. It deals with the role of microorganisms in processes such as cheese making, brewing and the production of vitamins, food additives, antibiotics and other economically important substances. It also includes topics such as sewage and waste treatment, conversion of biomass to fuels and the applications of biotechnology. The laboratory component consists of student projects with tutorial, seminar and group discussion of ideas and results.

3211B Systematic Survey of the Algae: lecture 2 hours, lab 3 hours, A.R.O. Chapman. Prerequisite: Grade B or better in Biology 2001. An examination of the taxonomic and evolutionary relationships of the algae. Considerable emphasis is placed on practical work (field and laboratory) where students become familiar with the algal components of the local flora.

3212A Biology of the Algae: lecture 2 hours, lab 3 hours, A.R.O. Chapman. Prerequisite: Grade B or better in Biology 2001. A non-systematic examination of the cellular, organismic, population and community organizations of benthic and planktonic algae.

3214A Plant Design: lecture 2 hours, lab or tutorials 1-3 hours, K.E. von Maltzahn. The structural design of plants in terms of the functional performance of their parts and their integration at different levels of organization. Types of design are established on the basis of comparative studies of life forms seeking to find homologies between the elements of design. Design in relation to climate and habitat is examined and integrated at the level of the landscape.

3215A Systematics of Higher Plants: lecture 2 hours, lab 3 hours, M.J. Harvey. This class has two main aims; first, to give consideration to current speculation on the evolution of the flowering plants, connecting this with the attempts over the years to produce a phylogenetic classification of the existing species; second, to go into some of the newer concepts of classification arising out of the 'computer revolution.' A plant collection is one requirement; consult the instructor as early as possible about this.

3216B Adaptation and Speciation in Higher Plants: lecture 2 hours, lab/-seminar 2 hours, M.J. Harvey. The discipline known as biosystematics or, alternatively, experimental taxonomy. The approach taken is analytic, considering particular examples and trying to deduce which peculiarities of their biology have contributed to their relative success. In this way the mechanisms which have caused particular species pairs to diverge are studied.

Examples considered are many and range from evening primroses and irises, through bananas and maize, down to the humble, but complex, dandelion.

3321 Invertebrates: lecture 3 hours, lab 3 hours, J. Farley. Prerequisite: Biology 1000. How different groups of invertebrate animals live — what modifications they have incorporated that allow them to survive in environments or to assume a manner of life unlike that of their evolutionary predecessors. Because there are so many kinds of invertebrate animals, certain morphological and functional changes are considered in those animals where they are most pronounced or where they first occur. The course progresses chronologically through the phylogenetic series; the characteristics of the animals in a group are considered and new physiological systems and morphological peculiarities are emphasized. A laboratory session each week gives students an opportunity to examine the morphology and life traits of live invertebrate animals.

***3322B Parasitology:** lecture 2 hours, lab 3 hours, E. Angelopoulos. The lectures emphasize the parasite-host relationships, evolution of the parasites and adaptations to the host, modifications of physiology, structure and life cycle for a parasitic existence. Examples are taken from all major animal groups beginning with the protozoa. Since the most extensive research pertains to parasites of man, the emphasis is on human parasites. Recommended for Ecologists and Pre-Meds. The laboratory stresses recognition and identification of parasites.

3323 Vertebrates: lecture 2 hours, tutorial 1 hour, lab 3 hours, E.T. Garside. Prerequisites: Biology 2001, 2002. A survey of the current state of knowledge and speculation concerning the evolution of vertebrate animals. Those vertebrates which have survived form a series of stages or steps, each characterized by several pronounced alterations in various organ-systems and in the general form of the body. Approximately three-quarters of the program is given to an analysis, by procedures of comparison and contrast, of these changes and their relevance in the synthesis of the evolutionary pathway. An appreciation of the classification, structure and evolution of vertebrates is essential to considerations of their development and functional capacities and of their relations with their surroundings and with each other. The laboratory study of a broad array of vertebrates provides the core and familiarizes the student with the gross anatomic features of these animals while giving instruction in the traditional approach to comparison and contrast.

3324 Entomology: lecture 2 hours, lab 3 hours, E. Angelopoulos. Entomology is an important branch of academic biology and also one of the largest divisions of applied biology. The class is an introduction to the study of insects dealing with: (1) The classification and evolutionary diversity of insects. (2) The biology, ecology and behaviour of insects. (3) Applied aspects — medical, agricultural and forest entomology, harmful and beneficial insects; biological control of insects.

3400 The Rise of Science and the Modern World (same as History 3070, Physics 3400, Religion 3500): lecture/seminar 2 hours, J. Farley, R. Ravindra. The modern world has been fundamentally altered by science and technology. In what ways? How has this come to be? This class, *designed for students in the arts as well as the sciences*, examines these questions from the origins of modern science in the 16th and 17th centuries, to the professionalization of science in the 19th and to the scientific-industrial complex of the 20th. In addition, specific scientific theories (theory of evolution, germ theory, relativity theory etc.) are examined.

***3401A The History of the Biological Sciences:** J. Farley. Designed for 3rd and 4th year students majoring in biology or geology. It deals mainly with selected topics in 19th and 20th century biology and geology. Students

are urged to follow up this class with Philosophy 242B: Philosophy and the Life Sciences. The history of medicine is treated in a separate class: History 2995B.

3410B Man in Nature: lecture 2 hours, tutorials 1 hour, K.E. von Maltzahn. An introduction to the science of nature which deals with structural order within organic nature, i.e. the relationships of different beings to each other including man within nature as a whole. The ideal of man's self-realization through his emancipation from nature is discussed. The class is concerned with man's biological and aesthetic and rational requirements and how these different needs affect one another. It inquires into the consequences which these needs may have upon man's judgements *and* actions and the well-being of nature as a whole. For students in the arts and sciences. There are no special prerequisites, but students must deal seriously with questions raised. The class is also useful for students in biology who wish to obtain a broader framework of knowledge. General degree students may not include this class in the 4 required for a Biology major. Honours students may count it towards their Biology requirements.

***3421 Comparative Vertebrate Histology:** D.M. Chapman (Anatomy Dept.). Prerequisites: Biology 2020 or 2015 and permission of the instructor. An advanced histology class surveying the whole range of vertebrate tissues and organs.

3430A Introduction to Human Histology: lecture 2 hours, lab 2 hours, D.H. Dixon (Anatomy Dept.) Prerequisites: Biol 2020A, or 2015 and permission of instructor. Histology is the study of the structure of cells, tissues and organ systems, and utilizes information derived from both light and electron microscopy. It complements studies in anatomy, cell biology, physiology and biochemistry, broadening the understanding of how organisms function.

3440B Neuroanatomy: lecture or lab 3 hours, D.A. Hopkins (Anatomy Dept.) Prerequisites: Biology 2020 or 2015 or permission of instructor. A survey of the histology, development and organization of the central nervous system, with emphasis on the developmental and structural relationships between spinal cord and brainstem. The organization of cranial nerves and microanatomy of the brain stem is discussed. The organization of sensory and motor systems is presented in detail. The cerebral cortex, cerebellum, basal ganglia, and limbic system are also covered.

***3614 Field Ecology:** lecture 1 hour, lab/field trip 4 hours (some weekend field trips), R. Scheibling, B. Freedman. Instructor C. Beauchamp. Prerequisites: Biology 2046 or 2060, Math 1060. Chem. 110. The class emphasizes field methods in ecology giving a broad coverage of terrestrial and aquatic ecosystems. It is recommended that all students interested in ecology take this class during their third or fourth year. Topics include: a) Biotic sampling methods, b) Environmental measurements, c) Analysis of Production, and d) Analysis of population and communities.

Specialized Classes

The following classes are primarily for honours and graduate students. They are open to others with permission of the instructor.

4024B Microscopy: lecture 2 hours, lab 3 hours, J.H.M. Willison, D.B. Stoltz, K.B. Easterbrook. Prerequisite: A grade of B or better in 3023A. A corollary to Biology 3023A. Instead of considering biological ultrastructure, the class deals with some of the principal methods involved in the study of cell structure. Both light and electron microscopy, including ancillary techniques, are considered in depth. The importance of a proper understanding of the physical and/or chemical principles governing technical procedures is emphasized. During laboratory periods students practise, or watch demonstrations of, some of the techniques covered in the lectures.

4025R The Mammalian Cell as a Microorganism: (Microbiology Dept.).

4030A Advanced Topics in Genetics: R.W. Lee and staff. Prerequisite: Permission of the instructor. A general topic from the current literature in genetics is examined in seminar format. The nature of the topic and the instructor in charge of the class vary from year to year. Students present at least one seminar during the term.

***4037B Plasmid Genetics:** (Microbiology Dept.).

***4038B Control of Cell Division:** (Microbiology Dept.).

4039B Topics in Human and Medical Genetics: lecture/seminar 2 hours, S. Blecher, O.P. Kamra (Coordinator), R.S. Tonks, J.P. Welch, E. Windsor, E. Zouros and others. Prerequisites: Biology 3039A or 1st year Medicine. An advanced level seminar open to Biology and Medical students. Students present reports based on a research project (experimental or literature search) conducted under the supervision of faculty members in Biology or one of the medical departments. Lectures from the faculty supplement class work and emphasize integration of student seminars into a self-contained unit.

***4050B Seminar in Development:** seminar 2 hours, B.K. Hall. Prerequisites: Biology 2050A or B, and Biology 3051B. Current concepts and models of cellular differentiation, organogenesis, morphogenesis and embryonic development. Emphasis on vertebrates.

4060B Environmental Ecology: lecture 2 hours, lab/tutorial 3 hours, B. Freedman. Prerequisites: Biology 2046 or 2060. Various topics within the field of Environmental Ecology are discussed. Emphasis is on the organism/ecosystem effects of forestry practices and other types of land management, including recreation. The effects of various types of pollutants, including acid precipitation, oil spills, heavy metals, sulphur dioxide, and chemical pesticides are considered.

***4064C Pleistocene Biogeography:** lab 3 hours, J.G. Ogden, III. Prerequisites: At least two credits in Biology or Geology. This class is to be taken in conjunction with Geology 457 Pleistocene Geology. Permission of the instructors. May be counted as Biology or Geology half-credit. Lecture, discussion, and laboratory experience in the reconstruction of environmental change during the Pleistocene epoch. Laboratory and field experience pay particular attention to the environmental history of the Maritime region, including environmental changes caused by man. Techniques of pollen analysis, plant and animal macrofossil study, dendochronology, geochemical and isotopic dating methods are explored. Field and laboratory work include a class problem in an area in the Halifax region.

4067B Fisheries Population Biology: seminar 2 hours, R.W. Doyle. Prerequisites: Biology 2060 or 2046 (the course is intended for Honours and graduate students only). Familiarity with elementary calculus and statistics is required. Prior experience with computers is not required. Enrolment limited to 8. An introduction to fisheries stock assessment and the biological aspects of fisheries management. Emphasis on the relationships between management techniques and the general principles of population biology. The class includes several weeks of introductory lectures followed by exercise in applied population dynamics lasting the remainder of the term. The exercise consists of a computer simulation of the growth and relation of a fish population of the student's choosing, coupled with computer-based investigations of the usefulness of various management models.

4068A Limnology: lecture 3 hours, lab/tutorial 3 hours, J.G. Ogden. Prerequisites: 2046, 2066 or 2060. The class is divided into four sections: (A) Physical Limnology-geology, morphometry, thermal properties, system hydrology & budgets, optical properties, vegetational interactions, history of limnology in N.S.; (B) Chemical limnology-oxygen, acidity/alkalinity, physical/chemical interactions, major/minor ions and heavy metals, organic

molecules, atmospheric geochemistry, ionic budgets and mass balances; (C) Biological limnology palaeolimnology, microbiology/phytoplankton, quantitative geochemistry, zooplankton/invertebrates, vertebrates, sampling technology; (D) Cultural limnology-eutrophication, BOD/COD, phosphorus loading, environmental impact assessments, acid rain, future shock.

4070C Advanced Topics in Animal Physiology: lecture 2 hours, open lab, R.K. O'Dor, M.L. Cameron, R.G. Boutilier. Instructor M.J. O'Halloran. Prerequisites: Biology 3070 or 3071. Whereas the introductory animal physiology classes emphasize common principles, this class emphasizes the diversity of physiological solutions to common problems among animals. A different problem is chosen each year and each student presents a seminar reviewing the literature on the solution of a particular animal and applies advanced techniques in an experimental study of the animal. Students choose the animal and the technique.

***4072C Animal Nutrition, J. Castell:** lecture and seminar, 2 hours. Prerequisites: Biology 2110A/B or equivalent and permission of instructor. Biology 3013A and 3071 are recommended. General principles and techniques of animal nutrition are reviewed and used to examine current literature. Emphasis is on the assessment of nutrition requirements of aquatic and marine species.

***4100A Marine Microbiology:** lecture 2 hours, seminar, discussion and laboratory, 2 hours, J.A. Novitsky. Prerequisite: Permission of the instructor. The role of microorganisms in the marine environment. Some of the topics that are discussed include: the effect of the ocean environment on, and the determination of, microbial biomass and activity; the role of bacteria in nutrient regeneration and the fertility of seawater, geomicrobiology; and the interactions between microorganisms and higher forms. The format of lectures, seminars and laboratory demonstrations and projects directs the class material towards the students' interests and backgrounds. The class is intended for serious students of biology, oceanography or marine science; successful completion gives the student an understanding and working knowledge of the microbiology of the oceanic environment even if previous knowledge of microbiology is limited.

4101B Industrial Microbiology and Biochemistry: lecture and seminar 2 hours, R.G.L. McCready. Prerequisites: Third-year class in biochemistry or microbiology. A class in organic chemistry is recommended. For students who have taken classes at the third-year level in microbiology or biochemistry and are interested in the practical applications of this knowledge. It deals through lectures with basic aspects of industrial fermentation processes and, through student seminars, explores topics in genetic engineering, antibiotic production and other current and projected uses of microorganisms in the manufacturing sphere.

4113A Bacterial Physiology: lecture 2 hours, lab 3 hours, R. Brown. Prerequisites: Biology 2100A/B and Chemistry 240 or Biology 2110 or 2015. Although the class concentrates on the structure and function of the bacterial cell envelope, that is, the capsule, cell wall and cell membrane, other topics such as the physiology of obligate anaerobiosis, sporulation, motility etc. are also covered.

4114B Virology: (Microbiology Dept.).

4115B Immunology: (Microbiology Dept.) Prerequisite: Biology 3115A.

***4214B Physiology of Marine Algae:** lecture 2 hours, J.S. Craigie. Prerequisites: Biology 2110 or 2015, 3010A. A comparative study of the physiology and biochemistry of the various algae classes is conducted, including studies of carbohydrates, proteins, fats, pigments and nutrition.

4275B Topics in Seaweed Biology: A.R.O. Chapman. Prerequisite: Permission of the instructor. The class examines the ecology of individuals, population and communities of seaweeds through reading, seminars and a few lectures.

4369A Fisheries Oceanography: lecture 3 hours, J.A. Koslow. Prerequisite: Biology 2060A or 2046R. Familiarity with calculus and statistical concepts helpful but not required. Permission of instructor is required. The ecology of fisheries with emphasis on the factors affecting their production and recruitment variability. Topics covered include physiology of fish production; classic management models; larval fish ecology; the effects of fishing and changing stock size, of climate, and of community interactions upon year-class variability.

4369B Fisheries Oceanography: J.S. Kowslow (Oceanography Dept.)

4379A Ichthyology: lecture 3 hours, E.T. Garside. Prerequisite: Biology 3323.

Evolution, systematics, structure, embryology, life history and distribution of fishes.

4401 Introduction to Pharmacology: lecture 2 hours, lab 2½ hours, H.A. Robertson (Coordinator for Dept. of Pharmacology.) Prerequisites: Permission of coordinator. This introductory class is designed to acquaint students with the actions of drugs on physiological and biochemical functions in mammals including man. Interactions of drugs with central and peripheral nervous systems and with the physiologically active chemicals (e.g. prostaglandins, peptides) are stressed. Factors affecting blood levels of drugs (absorption, distribution, metabolism and elimination) are considered, and potential uses. The laboratory consists of prescribed exercises followed by a project of several weeks duration carried out in the research laboratories of the Dept.

4403 Human Physiology: lecture 3 hours, B. Issekutz (Physiology/Biophysics Dept.). Prerequisites: Introductory classes in Chemistry and Physics. Permission of the instructor is required. A class dealing with the physiochemical basis of the physiological processes in man.

***4459B Electrical and Mechanical Activity of Cardiac Muscle:** A.Y.K. Wong, T.F. McDonald (Physiology/Biophysics Dept.) Prerequisite: Permission of the instructor. Mathematical characterization of the mechanics and energetics of muscle.

***4616B Ecosystem Analysis:** lecture/discussion 3 hours, P.A. Lane. Prerequisites: Biology 2060, 2066 or 2046, 3061; Math 1000, 1010. This class involves critical discussions of recent developments in the theory and practice of ecosystem analysis. The research literature is the text. The term is divided into four sections: *quantitative techniques*: (1) general systems theory, (2) ecosystem description methodologies, (3) systems analysis-computer simulation; and *qualitative techniques*: (4) loop analysis and time averaging. Each student must lead at least one discussion and present a short position paper on the theory underlying some of the important problems in ecosystem analysis. In addition, a term paper is required demonstrating a creative application of these methodologies to an environmental problem at the ecosystem level. Students complete program sets and exercises in data analysis to gain experience using various techniques. Aquatic ecosystems are emphasized.

4617 Theoretical Population Dynamics: lecture 2 hours, tutorial 1 hour, M.R. Rose. Prerequisites: Biology 2046 or 2060, Math 1000, 1010. The class is divided into five sections: (A) Single species population growth—including discrete and continuous time models, (B) Prey-predator interactions — including continuous and discrete time models, (C) Competition — including Lotka-Volterra models, higher-order competition models and symbiosis

models, (D) Simple ecosystems — including food chains, one predator and several prey, (E) Complex ecosystems.

4650/5650A Resource Ecology and Economic Development, lecture/seminar 3 hours, A.J. Hanson. Major theories of natural resource management have evolved rather separately through economic, behavioural and ecological disciplines. The interphase of ecology with these other disciplines and the criteria which may be used to weigh ecological inputs in economic development planning processes are the major topics to be covered. Current approaches and analytical techniques are described. These illustrate adaptive strategies for long-term resource use, pest and disease control. The course may focus on specialized topics such as fisheries or tropical resource management, as announced in advance. The class includes an introduction to practical problems of project cycles, of defining objectives and of budget analysis. It is open to students from any faculty by permission of the instructor.

4652A Advanced Ecology Seminar: consult Department.

4653B Advanced Ecology Seminar: consult Department.

4660B Introduction to Biological Oceanography: lecture 2 hours, open lab, M.R. Lewis. A survey of marine populations and their relationships with their physical environment and with each other. Permission of the instructor is required.

***4662B Biology of Phytoplankton:** R.O. Fournier. (Oceanography Dept.) Permission of instructor required. This class considers current topics in the field of biology of marine zooplankton. Aspects of the life of these organisms — such as feeding, locomotory behaviour, small-scale distribution and zoogeographic patterns — are studied in an attempt to understand how these small animals fit in their environment.

***4664B History of Oceanography:** lecture and seminar, E.L. Mills (Oceanography Dept.) Permission of instructor required. This class describes the development of Oceanography from biological, chemical, physical and geological knowledge going back to the 18th century in scientific political and social contexts. Includes: plankton dynamics, deep sea biology, ocean circulation and plate tectonics.

***4666B Benthic Ecology:** E.L. Mills. Permission of instructor required (Oceanography Dept). An advanced level undergraduate class concentrating on the major problems of benthic ecology, such as how food is supplied to benthic animals, what factors control the structure of biological communities and how the benthos is related to processes in the sediments. Year-to-year the course content changes, keeping up with current problems of research workers in this discipline.

4800 Special Topics

4806A/4807B/4808C Special Projects: staff.

4900 Honours Research and Thesis.

Canadian Studies Programs

Who are eligible

Dalhousie students who are planning to do, or are at present doing, major programs in any of the following six departments, are eligible.

The six departments are: Economics, English, French, History, Political Science and Sociology & Social Anthropology.

Aim

The purpose of the program is to allow such students to concentrate part of their work on Canadian studies both within their major field, and outside of it. For example, a student who is planning to major in Political Science would take at least 3 of his political science classes in classes designated as Canadian. He would in addition take four classes outside his major field in Canadian Economics, Canadian History, Canadian Literature (either English or French), or Canadian Sociology.

In other words, the Canadian Studies Program does not attempt to establish a new major field. It seeks to use any one of six present departments in the Faculty of Arts and Science as a base around which a student may effectively cluster a number of classes in Canadian subjects.

How to arrange it

Students wishing to discuss a Canadian Studies Program, or wishing to take it, should get in touch with any of the following:

Professor B. Lesser, Economics Department
 Professor M.G. Parks, English Department
 Professor Hans Runte, French Department
 Professor P.G. Clark, Sociology & Social Anthropology Department
 Professor D.S. Stairs, Political Science Department
 Professor P.B. Waite, History Department

Chemistry

Chairperson of Department

W.A. Aue

Professors

D.R. Arnold, BS (Bethany College), PhD (Roch.)
 W.A. Aue, PhD (Vienna)
 T.S. Cameron, BA, MA, DPhil (Oxon.)
 W.J. Chute, BSc (Acad.), MA, PhD (Tor.)
 J.A. Coxon, MA (Cantab.), MSc, PhD (East Anglia)
 T.P. Forrest, BSc (MtA), MSc (Dal), PhD (UNB)
 K.E. Hayes, BSc (Lond.), PhD (Ore.)
 W.E. Jones, BSc, MSc (MtA), PhD (McG) — Chairman of Senate
 O. Knop, DSc (Laval) — Harry Shirreff Professor of Chemical Research
 J.C.T. Kwak, BSc, MSc, PhD (Amsterdam)

K.T. Leffek, BSc, PhD (Lond.) — Dean of Faculty of Graduate Studies
 D.E. Ryan, BSc (UNB), MA (Tor.), PhD, DSc (Lond.), DIC — *McLeod Professor of Chemistry; Director, Trace Analysis Research Centre and Slowpoke Reactor*

Associate Professors

R.J. Boyd, BSc (UBC), PhD (McG)
 A. Chatt, BSc (Calcutta), MSc (Roorkee), MSc (Wat.), PhD (Tor.)
 G.A. Dauphinee, BSc, MSc (Dal)
 T.B. Grindley, BSc, MSc, PhD (Queen's)
 J.S. Grossert, BSc, MSc, PhD (Natal)
 D.L. Hooper, BSc, MSc, PhD (UNB)
 P.D. Pacey, BSc (McG), PhD (Tor.)
 J.A. Pincock, BSc, MSc (Man.), PhD (Tor.)
 L. Ramaley, BA (Col.), MA, PhD (Prin.)
 R. Stephens, MA (Cantab.), MSc (Bristol), PhD (Lond.), DIC
 C.H. Warren, BSc (UWO), PhD (McM)
 R.E. Wasylishen, BSc (Wat.), MSc, PhD (Man.)

Assistant Professors

K.R. Grundy, BSc, MSc, PhD (Auk.)
 R.D. Guy, BSc (SFU), PhD (Carl.)

NSERC Research Fellows

B.J. Forrest, BSc (UWO), MSc (Bishop's), PhD (SFU)
 M.A. White, BSc (UWO), PhD (McM)

Visiting Scientists

J.E. Fergusson, University of Canterbury, New Zealand
 K.Sakai, Tokai University, Japan
 X. Feng, Chinese Academy of Sciences
 T.Z. Guo, Qinghai Geology Bureau, China
 M.H. Kaistila, Technical Research Centre of Finland

Research Assistant

S.W. Kim, PhD (Wayne State)

Instructors

C.D. Burkholder, BSc (Wat.)
 J. Gabor, MSc (Budapest)
 S.A. Sawler, BSc, (MSVU)
 D.J. Silvert, M.S. (CWRU)
 N.E. Somers, BSc (McG)
 W.D. Tacreiter, MSc (Krakow)
 K.E. Thompson, BSc (Acad.)
 M.E. Warren, BSc (Western)

Postdoctoral Fellows and Research Associates (1984)

D. Adhikesavalu, PhD (IISc. Bangalore)
 A.D. Becke, PhD (McM)
 H. Bem, PhD (Lodz)
 M. Daniewski, PhD (Warsaw)
 S.A. Deraniyagala, PhD (Dal)
 S.P. Deraniyagala, PhD (Dal)
 K.N. De Silva, PhD (Dal)
 S.M. De Silva, PhD (Dal)
 H. Flakus, PhD (Krakow)
 H. Furue, PhD (Queen's)
 M. Hojatti, PhD (Essex)
 U. Maciejwska, PhD (Gdansk)
 N. Mathur, PhD (Dal)
 S. Muddukrisna, PhD (IIT, Kanpur)
 A. Okamoto, PhD (Tokyo)
 V. Paramasigamani, PhD (Dal)

S. Peiris, PhD (Concordia)
 U.K. Roychowdhury, PhD (IIT, Kanpur)
 P. Sunkada, PhD (IISc, Bangalore)
 J. Wierzchowcki, PhD (Warsaw)
 A.B. Yamashita, PhD (UWO)

Chemistry is one of the fundamental sciences. It explores the interactions among different forms of matter and energy. Its main purpose is to gain a basic — but also a very useful — understanding of how compounds react and when and why they form particular products. Chemical knowledge helps us influence the world in which we live; chemical principles and procedures are found embedded everywhere in the groundwork of the natural and medical sciences. Chemistry, in short, constitutes an integral part of the environment and education of modern man.

A student considering an honours program in chemistry should be competent in mathematics as well as chemistry. The honours BSc is the minimum professional requirement for a chemist — the general BSc with a major in chemistry has no professional standing. Chemists with honours degrees are employed in widely differing areas in industry and government. An honours degree in chemistry will provide a background for further graduate work in chemistry or in such diverse areas as medicine, law, business administration, biochemistry, oceanography and geology. A postgraduate degree is essential for independent original research or university teaching.

Chemistry 110 (or 111 or 112 or 120) is an introduction to the discipline. All students intending to take classes in chemistry beyond the first-year level should include classes in mathematics and physics in their first year. Final grades in these classes should not be less than C; if they are, the student is bound to find advanced classes in chemistry difficult and frustrating.

At the second-year level the student is exposed to the four traditional areas of chemistry specialization. Inorganic chemistry deals with all the chemical elements except carbon, and the compounds which these elements form. Organic chemistry is devoted to the study of the almost limitless number of compounds containing carbon. Analytical chemistry is concerned with the determination of the composition of substances, and with the detection of elements in quantities however minute. Physical chemistry is concerned with both bulk phenomena (including why and at what rates chemical reactions occur) and with molecular phenomena (through the application of spectroscopic techniques). Beyond the second-year level, a student's studies in chemistry become increasingly concentrated in one of these four areas. The student may also be introduced to biochemistry or the chemistry of living organisms, as well as such specialties as structural chemistry, radiochemistry, electrochemistry and theoretical chemistry.

Degree Programs

Major in Chemistry

In order to obtain as general a chemical background as possible, the student, after taking Chemistry 110, or 111, or 112, or 120, should include in his program the classes 211A/B, 220A/B, 231A, 232B and 240, which give exposure to the four areas of specialization in chemistry. The remaining requirements in chemistry may be chosen from third and fourth-year classes depending on the student's major interests. Each student who plans to major in chemistry should consult with a Chemistry Counsellor each year regarding a program of study. The student's program should also include Mathematics 100 and 101 and Physics 110.

The Chemistry Counsellors this year are A. Chatt, W.J. Chute, B.J. Forrest, K.R. Grundy, D.L. Hooper, J.C.T. Kwak and J.A. Pincock. All students are encouraged to meet with one of these faculty members to discuss any problems that may arise.

All chemistry classes to be counted towards the major in chemistry must be passed with a grade of C- or better.

Honours in Chemistry

This program is intended to provide a broad training in chemistry while at the same time making provision for the individual interests of students. All honours students must consult annually with an Honours Student Advisor (W.J. Chute or J.A. Pincock), and obtain his approval of their course selection.

All required chemistry classes must be passed with a grade of at least C.

Year I will normally consist of: Chemistry 110 or preferably Chemistry 120; Mathematics 1000 and 1010, a foreign language at the 100 level; one of Biology 1000, Geology 100 or Physics 1100; plus an elective.

Years II, III and IV must include:

1. Chemistry 211A/B, 220A/B, 231A, 232B, and 240
2. Six full classes from Chemistry 300 and 400 levels. Chemistry 300A, 311A, 312B, 321A, 322B, 330A, 331B, 341A, and 342B are required classes (335R will replace 330A and 331B starting in 1986/87). In addition the non-credit classes 388, 488 and 8880 must be taken.
3. Mathematics 2000 or 2200; a prerequisite for Chemistry 300A, 330A and 335.
4. Five other classes. These must be chosen as follows:
 - a) If Physics 1100 was not taken in Year I, it must be taken in Years II-IV.
 - b) Two classes beyond the 100-level must be taken in a minor subject. Minor subjects allowed for this degree are biochemistry, biology, computing science, geology, mathematics or physics.

These five other classes should be chosen according to the future plans of the student.

Combined Honours Program

The department has designed a number of programs which allow a student to obtain a Combined Honours Degree in Chemistry with one of Biochemistry, Biology, Computing Science, Geology, Mathematics or Physics. To obtain an introduction into all the basic areas of chemistry, Chemistry 211A/B, 220A/B, 231A, 232B and 240 must be part of all combined honours programs involving Chemistry, and must be passed with a grade of at least C.

In addition to the above second-year chemistry classes, the following programs are suggested for guidance to the student.

Combined with Biochemistry

Chemistry 341A, 342B, 343A/B, 433A/B, 440A/B, 441A/B, 442A/B and 8880, together with Biochemistry 2000R, 2600A/B, 3200A, 3300B, 3400B and 1 ½ other full credits in Biochemistry and Chemistry of which one must be in Biochemistry.

Combined with Biology

Chemistry 213A, 341A, 342B, 343A/B, 440A/B, 441A/B, 442A/B and 8880 with Biology 2000, 2010A/B, 2020A/B and 2 ½ other full credits in Biology and Chemistry of which at least two must be in Biology.

Combined with Computing Science

Chemistry 300A, 336B, 400A/B, 430A/B, 435A/B and 8880 with Computing Science 2270B, 2450A, 2610A/B, 3690A, 3700A/B and 3 other credits in Chemistry and Computing Science of which at least 1 ½ must be in Computing Science. Students are reminded that Math 1000A/B, 1010A/B, 2030A, Computing Science 1400A/B and 1410A/B are prerequisites to the Computing Science classes.

Combined with Geology

Chemistry 311A, 312B, 321A, 322B, 410A, 412B and 8880 with Geology 210, 220 and 3 other full credits in Chemistry and Geology of which at least two must be in Geology.

Combined with Mathematics

Chemistry 300A, 330A or 335, 336B, 400B, 430A/B and 8880 with Mathematics 2130, 2500, 3030, 3500 and four more half-classes of 3000 and 4000 level Mathematics, of which at least two must be at the 4000 level.

Combined with Physics

Chemistry 300A, 330A, 331B, 336B, 400B and 8880 with Physics 2110, 2120, 2200A, 2210B, 3140A, 3150B, 3210A/B, 3200A/B and 1 other chemistry or physics credit.

The above are only guidelines and students must consult an Honours Student Advisor of the Department of Chemistry (W.J. Chute or J.A. Pincock) and the Chairman of the other area of study *before* registering in the combined program.

Cooperative Education Program in Chemistry

The "Dalchem Co-op" program in chemistry does not admit any new students at the present time.

Students already in the program should refer to regulations published in prior Calendars. For further information contact an Honours Student Advisor of the Department of Chemistry.

Classes Offered

A or B indicates that the class is a half credit and is offered in either the A or B term or in exceptional circumstances in both terms. The names of professors teaching the classes are tentative. Consult the timetable for up-to-date details.

Early registration for classes is strongly encouraged. In recent years certain classes, particularly Chemistry 110, 211, 220, and 240, have reached maximum possible enrolment long before completion of the final registration period in September.

Students who have passed a first-year Chemistry class with a grade of D should consider themselves inadequately prepared for advanced studies in this subject. Such students will not be allowed to register directly for second-year Chemistry classes but may request that their names be put on a waiting list for registration in such classes. Consult the Department for details. Duly registered students, who do not show up during the first week of classes, may lose their place to students on the waiting list.

First Year and Senior Resource Centres are located in Rooms 167 and 166. The former is staffed with people who can help with Chemistry problems. Facilities include study areas, computer terminals with special programs designed for Chemistry students, molecular models, audio-visual aids and a small library.

105 Chemistry For Dental Hygiene Students: lecture 3 hours, lab 3 hours, G.A. Dauphinee. A credit class for students enrolled in Dental Hygiene *only*. Chemistry 105 is not a prerequisite to second-year chemistry classes. The subjects discussed in the first term include atomic structure, solution equilibria and simple inorganic chemistry; organic chemistry is discussed in the second half of the year. Laboratory experiments are integrated with the material discussed in lectures.

110 General Chemistry: lecture 3 hours, lab/tutorial 3 hours, W.A. Aue, W.J. Chute, J.A. Coxon, G.A. Dauphinee, R.D. Guy, W.E. Jones, J.C.T. Kwak, D.E. Ryan. A study of the fundamental principles of chemistry with particular reference to stoichiometry, atomic and molecular structure, gases, liquids and solids, solutions, thermochemistry, equilibria, chemical properties of common substances, acid-base and oxidation-reduction reactions and chemical kinetics. Students enrolling in this class should have a background in chemistry equivalent to the Nova Scotia XII level. Mature students should consult the Department. It is important that students be familiar with exponents and logarithms, proportionality and variation, and graphical methods; and be able to solve quadratic and simultaneous equations.

111 General Chemistry for Engineering Students: lecture 3 hours, lab/tutorial 3 hours, K.E. Hayes. Similar to Chemistry 110, but with a greater emphasis on the mathematical approach to chemistry. Basic chemical thermodynamics is presented in an exact algebraic manner, and includes a study of isothermal and adiabatic transformations for ideal gas systems as well as isothermal equilibria between liquids and vapors. All of the other topics, such as gas phase equilibria, the Gibbs-Helmholtz equation, electrochemistry and reaction kinetics are treated mathematically. Wherever possible examples and problems are selected from the real world. This class is open only to students enrolled in the Engineering program.

112 General Chemistry for Pharmacy Students: lecture 3 hours, lab/tutorial 3 hours, B.J. Forrest. The content of this class is essentially the same as that of Chemistry 110 except that emphasis is on certain areas of importance in Pharmacy.

120 Principles of Chemistry: lecture 3 hours, lab/tutorial 3 hours, R.J. Boyd. Similar to Chemistry 110 but with more emphasis on atomic and molecular structure, thermodynamics, equilibria and kinetics. This class is intended for prospective science students and for students wishing to gain a more thorough introduction to the principles of chemistry. Students enrolling in this class must have attained high standing in high school chemistry. Concurrent enrolment in Mathematics 1000 and 1010 is advised.

Any of Chem. 110, 111, 112 or 120 may serve as a prerequisite for any 200 level class in chemistry, and as a credit in the Faculty of Arts and Science. However, credit will only be given for one of 110, 111, 112 or 120.

143 Introductory Chemistry and Biochemistry: lecture 3 hours, lab/tutorial 3 hours, G.A. Dauphinee and F.I. Maclean. Designed for Nursing students; for more details see School of Nursing's entry in this calendar. Material in the first term is given by the Department of Chemistry and includes the fundamentals of general and organic chemistry. In the second term medically relevant biochemistry is discussed by the Department of Biochemistry.

211A (or B) Introductory Inorganic Chemistry: lecture 3 hours, lab 3 hours, K.R. Grundy. Prerequisite: Chemistry 110 (111, 112, 120). The fundamentals of inorganic chemistry are covered. Specific topics include: ionic bonding and the nature of solids, the structure of atoms and simple molecular orbital theory, coordination chemistry of the transition metals and a certain amount of systematic chemistry of inorganic compounds. The preparation, analysis and observation of inorganic compounds are the laboratory assignments.

213A (or B) Inorganic Chemistry of Life: lecture 2 hours, lab 3 hours, T.S. Cameron. Prerequisite: A good understanding of the principles studied in Chemistry 110. This class may not be included in nine chemistry credits required for an honours chemistry degree, see Academic Programs, page 24; it may however be taken by honours chemistry students in addition to these nine. Inorganic elements and their compounds in living systems, their special properties, structures and reactivities are studied. The laboratory illustrates class work with experiments on compounds isolated from living systems and on inorganic compounds that are used as models for these systems.

220A (or B) Introductory Analytical Chemistry: lecture 3 hours, lab 3 hours, A. Chatt. Prerequisite: Chemistry 110 (111, 112, 120). A thorough introduction to non-trace analytical techniques and to those instrumental techniques most often encountered in the laboratory. Topics include theory of titrations; gravimetric analysis; acid-base, precipitation and redox equilibria; spectrophotometry; potentiometry with ion selective electrodes; and chromatography. Examples of topics covered in the lecture are used in the laboratory, which involves both qualitative and quantitative chemical analysis.

231A Introduction to Physical Chemistry — Energetics: lecture 3 hours, lab 3 hours, R.E. Wasylishen. Prerequisites: Chemistry 110 (111, 112, 120), Mathematics 1000, 1010. This class together with 232B introduces students to the fundamental principles of physical chemistry. The course stresses the energies of both molecular systems, where quantum mechanical results are introduced, and macroscopic systems, which are treated using the laws and basic concepts of classical thermodynamics. The molecular basis of the ideal gas laws is also discussed. The laboratory sessions illustrate many aspects of the material presented in lectures.

232B Introduction to Physical Chemistry — Dynamics: lecture 3 hours, lab 3 hours, J.A. Coxon. Prerequisites: Chemistry 231A or equivalent. An introduction to statistical mechanics, reaction kinetics, and atomic and molecular spectroscopy.

233A (or B) Physical Chemistry for the Life Sciences: lecture 3 hours, lab/tutorial 3 hours, R.E. Wasylishen. Prerequisite: Chemistry 110 (111, 112, 120). Chemistry majors may not apply credit for Chemistry 233 towards the major requirements for a degree in Chemistry, although they may take Chemistry 233 as an elective. Credit will *not* be given for both Chemistry 230 and Chemistry 233. Except for majors and honours programs, credit will be given for both Chemistry 234B and Chemistry 233. Credit will *not* be given for both of Chemistry 231 and Chemistry 233 or for both of Chemistry 232 and Chemistry 233. Those who do not plan a career in chemistry, but who can use the principles and concepts of physical chemistry in related areas, are introduced to the basic ideas of physical chemistry with the necessary mathematical concepts in simple terms. Previous knowledge of calculus is not necessary. The principal topics, thermodynamics, rates of enzyme catalyzed reactions, chemical equilibrium and spectroscopy are treated by application to examples of biological and environmental interest.

240 Introductory Organic Chemistry: lecture 3 hours, lab 3 hours, D.R. Arnold, T.P. Forrest, T.B. Grindley, J.S. Grossert, J.A. Pincock. Prerequisite: A good comprehension of the principles studied in Chemistry 110. A broad introduction to the chemistry of carbon compounds, including molecular shapes and bonding, characteristic reactions of functional groups and the way in which they take place, and the application of spectroscopy to organic chemistry. Laboratory work is designed to teach a broad range of fundamental operations and techniques used in modern organic chemistry laboratories.

300A Introductory Theoretical Chemistry: lecture 3 hours, C.H. Warren. Prerequisites: Mathematics 2000 or 2200 and Chemistry 211A/B or 230A or 234B. An introduction to quantum mechanics and its application to spectroscopy and the electronic structure of atoms. The postulates of quantum mechanics are presented and applied to some simple physical systems, followed by a discussion of the rotations and vibrations of molecules, and the electronic structure of atoms, concluding with an introduction to the simple Hückel molecular orbital method.

311A Chemistry of the Main Group Elements: lecture 2 hours, lab 3 hours, T.S. Cameron. Prerequisite: Chemistry 211A/B. A systematic study of the chemistry of the main group elements, with particular emphasis on the nonmetals of the first and second row elements. Use is made of modern bonding concepts. The laboratory introduces synthetic procedures for the preparation of inorganic compounds including study of their reactions. Some of these experiments involve special handling techniques, such as controlled atmosphere, high temperature or vacuum line manipulation.

312B Chemistry of the Transition Metals: lecture 2 hours, lab 3 hours, O. Knop. Prerequisites: Chemistry 211A/B, Mathematics 1000 and 1010. The transition elements and their complexes, using modern bonding theories (crystal and ligand field), are covered, unifying the chemical and physical properties of these substances. The laboratory experiments introduce

procedures for the preparation and characterization of compounds of the transition elements.

321A Solution Equilibria and Analytical Spectroscopy: lecture 3 hours, lab 3 hours, A. Chatt. Prerequisite: Chemistry 220A/B. Chemistry 321A is organized into three units. 1. Introduction to Statistics; 2. Chemical equilibria and their analytical applications; and 3. Spectrochemical methods of analysis. Laboratory experiments illustrate the above techniques with practical examples.

322B Analytical Electrochemistry and Separations: lecture 3 hours, lab 3 hours, R.D. Guy. Prerequisites: Chemistry 220A/B and 321A or permission of the instructor. Chemistry 322B deals with the application of electrochemical and separation techniques to chemical analysis. The basic chemical and physical principles are explained, applications to analytical problems are examined and instrumentation is described. The laboratory work is concerned with practical examples of the above techniques in both qualitative and quantitative analysis.

330A Chemical Thermodynamics: lecture 2 hours, lab as needed, M.A. White. Prerequisites: Chemistry 230A or equivalent and Mathematics 2000 or 2200. A good working knowledge of calculus is required. *Chemistry 330A will not be offered after 1985/6.* The laws of thermodynamics are applied to systems which can undergo chemical as well as physical changes. The first part of the class introduces the thermodynamic quantities, and the calculation of these properties for a large variety of systems and physical and chemical changes. Special emphasis will be placed on the chemical potential and other partial molar properties. Non-ideal systems, solutions, and chemically reacting systems will be treated. At least 4 laboratory experiments and reports will be completed by each student during the term, including 1 report (of the student's choice) as a formal report.

331B Chemical Kinetics: lecture 2 hours, lab as needed, W.E. Jones. Prerequisite: Chemistry 230A or equivalent. *Chemistry 331B will not be offered after 1985/6.* Chemical kinetics includes the treatment of experimental rate data obtained from simple and complex reactions, the steady state approximation and its application, the Rice-Herzfeld approach to complex reactions, photolysis, and special techniques for studying fast reactions. Examples are drawn from reactions in the gas phase and in liquid solutions. An understanding of the mechanisms of chemical reactions is sought by using the methods of Absolute Reaction Rate Theory. The laboratory is open at all times. Each student completes at least five experiments.

335R Intermediate Physical Chemistry — Properties of Matter: lecture 3 hours, lab 3 hours, alternate weeks, staff. Prerequisites: Chemistry 231A, 232B and 300A and Mathematics 2000 or 2200 or equivalents. Chemistry 300A may be taken concurrently. Credit will not be given for both Chemistry 335R and Chemistry 337A/B, or for Chemistry 335R and Chemistry 330A, or for Chemistry 335R and Chemistry 331B. *Chemistry 335R will be offered for the first time in 1986/87.* This course begins with a discussion of the thermodynamics of real systems, including activities, chemical potentials and phase diagrams for pure and mixed gases, liquids, and solids. Approaches to understanding the rates and mechanisms of chemical changes will be described. The course will conclude with a study of microwave, infrared, Raman, electronic, laser, photoelectron and magnetic resonance spectroscopy.

336B Numerical Methods in Chemistry: lecture 3 hours, C.H. Warren. Prerequisites: Chemistry 230A, 234B (or Chemistry 231 and 232), and Mathematics 2000 or 2200 or permission from the instructor. This class provides an introduction to numerical methods that can be applied to various problems in chemistry. Students will utilize these techniques on programmable calculators, microcomputers, and Dalhousie's mainframe computer.

Topics to be covered include the treatment of experimental data by least squares methods; by curve fitting, smoothing, and interpolation techniques; and by numerical integration. Matrices, determinants, and eigenvalue equations will be studied and applied to problems in quantum chemistry and spectroscopy. Complex equilibria will be examined through the numerical solution of simultaneous equations. Computer graphics will be introduced and applied to topics such as wavefunctions, gas laws, potential energy contours, coordinate transformations and molecular geometries. Computer simulation of experiments will also be examined.

337A or B Applied Physical Chemistry: lecture 2 hours, tutorial 1 hour, lab 3 hours (alternate weeks), staff. Prerequisites: Chemistry 231A and 232B or 233 with permission of the instructor. Credit will not be given for both Chemistry 335R and Chemistry 337, or for Chemistry 337 and Chemistry 330A, or for Chemistry 337 and Chemistry 331B. *Chemistry 337 will be offered for the first time in 1986/87.* This is an intermediate level class in applications of physical chemistry concepts, intended for students other than honours chemistry students. Topics covered will include the theory and experimental methods of determining the following: the phases of matter, the non-ideality of matter, molecular weights, molecular structure, rates of chemical reactions. The course will give an introduction to and draw examples from solution chemistry, electrochemistry, colloid chemistry, metallurgy and polymer chemistry.

341A (or B) Identification of Organic Compounds: lecture 3 hours, lab 3 hours, T.B. Grindley. Prerequisites: Chemistry 240 (or equivalent). The techniques necessary for the identification of organic compounds are introduced. Some presentation of the classical analysis methods is given, but the main emphasis is on modern spectroscopic techniques. The class builds on the framework of the functional group classification developed in introductory organic chemistry classes. Students work independently in the laboratory to identify unknown substances and to separate and identify components of mixtures using a variety of techniques.

342B (or A) Synthesis in Organic Chemistry: lecture 3 hours, lab 3 hours, J.S. Grössert. Prerequisites: Chemistry 240 (or equivalent). The reactions of a variety of functional groups and their applications to multi-step organic syntheses are surveyed. Examples chosen include syntheses of compounds which are important to the chemical and pharmaceutical industries. Students work independently in the laboratory and carry out a variety of syntheses. Experiments are designed so that students learn to monitor the purity of their products by the use of spectroscopic and other techniques. Some library work is required.

343A (or B) Bioorganic Chemistry: lecture 3 hours, T.P. Forrest. Prerequisites: Chemistry 240 (or equivalent). This class may *not* be included in the nine chemistry credits required for an honours chemistry degree (Academic Programs page 24). It may however be taken by honours chemistry students in addition to these nine. Since molecules in nature operate under the same rules as those in an organic laboratory, one can apply the principles elucidated in the organic laboratory to the study of the behavior of organic compounds in nature. To cause a reaction to occur in the laboratory it might be necessary to alter functional groups and provide other conditions necessary to induce a particular reactivity. An analysis of the requirements for reactivity, methods by which these can be achieved and the influence of various factors on the outcome of reactions serve as the basis for the consideration of selected naturally occurring reaction pathways.

388 General Topics in Chemistry: a non-credit class to be given by invited speakers which must be taken by all 3rd year honours Chemistry students.

***400B Theoretical Chemistry:** lecture 2 hours; R.J. Boyd. Prerequisites: Chemistry 300A. A continuation of 300A. Molecular orbital theory and its applications are examined in greater detail. Group theory is introduced and applied to spectroscopy and molecular orbital theory.

***410A or B Inorganic and Organometallic Reaction Mechanisms in Synthesis:** lecture 2 hours, lab 3 hours, K.R. Grundy. Prerequisites: Chemistry 311 and 312 or permission of the instructor. This class examines the fundamental aspects of inorganic reaction mechanisms such as substitution, isomerisation, oxidative addition, insertion, etc., together with their applications to inorganic synthesis. The laboratory is project oriented with each project illustrating the various mechanistic paths discussed in class. The experiments incorporate modern inorganic synthetic techniques and characterization by instrumental methods where appropriate.

***412B Solid State Chemistry:** lecture 2 hours, lab 3 hours, O. Knop. Prerequisites: Chemistry 211A/B, 330A, and 435A (or equivalents) or consent of instructor. All chemical elements and compounds can exist as crystalline solids, and most of them normally do. The arrangements of atoms and molecules in such solids, known as crystal structures, closely reflect the bonding properties and constituent elements. They can be studied by methods that do not destroy or modify the crystal structure. The methods most frequently employed for this purpose together with the principles of solid state chemistry in general are covered.

420A (or B) Analytical Instrumentation: lecture 2 hours, lab 3 hours, R. Stephens. Prerequisites: Chemistry 321A and 322B or permission of instructor. Spectroscopic methods of elemental analysis. The theory and use of analytical instruments. Specific topics discussed change from year to year according to the interests of the professor and the students.

421B (or A) Instrumental Analysis: lecture 2 hours, lab 3 hours, R. Stephens. Prerequisites: Chemistry 321A and 322B or permission of instructor. Various instrumental techniques are covered, with emphasis on electronics. Specific topics discussed change yearly according to the interests of professor and students.

***430B (or A) Introductory Statistical Thermodynamics:** lecture 3 hours, M.A. White. Prerequisites: Chemistry 330A or permission of the instructor. An introduction to the principles of statistical thermodynamics and quantum statistical mechanics. Wherever possible the application of statistical thermodynamics to chemical systems as well as physical and biological processes is emphasized.

433A (or B) Biophysical Chemistry: lecture 2 hours, lab 3 hours, alternate weeks, J.C.T. Kwak. Prerequisites: Chemistry 230A, 234B and either Chemistry 330A and 331B, or 335 or 337, or permission of the instructor. A theoretical and practical introduction necessary for the application of physical chemistry in life sciences and medicine. Topics include the structure and conformation of biological macromolecules, techniques for the study of biological structure and function, transport processes and biochemical spectroscopy. The laboratory is on an open basis with at least four experiments completed during the term.

435A Symmetry and Group Theory: lecture 2 hours, compulsory tutorial 3 hours, C.H. Warren. Prerequisites: Chemistry 211A/B and Mathematics 2000 or 2200 or consent of instructor. The theory of abstract groups and their representations, crystallographic and non-crystallographic point groups, and an introduction to the theory of space groups are presented. Examples from stereochemistry, crystallography, and spectroscopy illustrate the theory. Knowledge of elementary manipulations of matrices and determinants is desirable.

440A (or B) Organic Spectroscopy: lecture 2 hours, lab 3 hours, D.L. Hooper. Prerequisites: Chemistry 341A or equivalent, or permission of instructor. Nuclear Magnetic Resonance experiments and their interpretation. Application of NMR and other spectroscopic methods to the structure determination of organic molecules.

***441A (or B) Stereochemistry and Synthesis in Organic Chemistry:** lecture 2 hours, lab 3 hours, D.R. Arnold. Prerequisites: Chemistry 341A, 342B or equivalent, or permission of instructor. Organic stereochemistry including conformation and synthesis, illustrated with examples from natural products, are discussed. Laboratory experiments incorporate modern, advanced synthetic techniques and principles.

***442B (or A) Organic Reaction Mechanisms:** lecture 2 hours, lab 3 hours, K.T. Leffek. Prerequisites: Chemistry 341A, 342B and Chemistry 230A or equivalents, or permission of the instructor. Methods for determining the mechanisms of organic reactions are discussed from the viewpoint of the physical organic chemist. Topics considered include applications of kinetic data, isotope and salt effects, linear free energy relationships and acid and base catalysis. The laboratory illustrates the variety of methods used to study the above topics.

488 Advanced Topics in Chemistry: a non-credit seminar to be given by invited speakers which must be taken by all 4th year Honours Chemistry students.

8880 Honours Examination: This is an additional class required of all Honours students in Chemistry in order to satisfy requirement 11.3 Academic Programs on page 24. It should be taken in the final year of a concentrated chemistry honours program. All honours students, whether in concentrated or unconcentrated program, must consult with the professor in charge of the Honours Thesis Program (J.C.T. Kwak).

Classics

Chairperson of Department
R. Friedrich

Visiting Professor
L. Obertello (Professor, University of Genoa)

Professor Emeritus
J.A. Doull, BA (Dal), MA (Tor.)

Adjunct Professor
A.H. Armstrong, MA (Cantab.), FBA

Professors
J.P. Atherton, MA (Oxon.), PhD (Liverpool)
R.D. Crouse, BA (Vind.), STB (Harv.), MTh (Trin.), PhD (Harv.) DD (Trin.)
R. Friedrich, Dr.phil. (Goettingen)
T.E.W. Segelberg, DTh, FK (Upsala)

Associate Professors
W.J. Hankey, BA (Vind.), MA (Tor.), DPhil (Oxon.)
P.F. Kussmaul, Dr.phil. (Basle), Dr.phil.habil. (Heidelberg)
C.J. Starnes, BA (Bishop's), STB (Harv.), MA (McG), PhD (Dal) *Undergraduate Studies Advisor.*

Assistant Professors
P.J. Calkin, BA (UBC), MA (Dal), PhD (Dal)
D.K. House, MA (Dal), PhD (Liverpool), *Graduate Studies Adviser*
A.M. Johnston, BA (MtA), MA, PhD (Dal)

Post Doctoral Fellow
S.P. Forde, BA (Yale), PhD (Tor.)

Classics is the study of our origins — how the Christian-European tradition to which we belong arose out of the ancient civilizations of the Mediterranean area. The fundamental ideas and beliefs of Europeans and North Americans, by which we are distinguished from Chinese, Indians, and those of other traditions, were formed in the meeting of Greek and Oriental cultures in ancient times. To understand fully our own contemporary culture, we must study its historical origins.

Classics is more than the study of ancient languages. Languages are not learned for themselves, but because they are necessary for the scientific study of ancient history, literature, religion, mythology and philosophy. The Classics Department at Dalhousie provides instruction both in these subjects and in ancient languages. While previous preparation in one or more ancient languages is desirable, it is nevertheless quite feasible for a student who discovers an interest in classics to begin his language studies at university.

Students of classics usually learn Greek and Latin. Instruction may also be had in Hebrew, Coptic, Syriac and Arabic.

It is obvious that classics is worth studying for its own sake by students who wish to obtain a better understanding of the common assumptions and beliefs of our society. This knowledge has always been regarded as pertinent to a career in politics and the higher levels of the civil service. For those who are thinking of the clergy, classics is the most relevant preparation.

Classical studies also prepares students for a life of teaching and scholarship in several directions. Canada is responsible for its own culture, and we have great need of scholars and teachers who know about our origins. Teachers of classics for schools and universities are hard to find in Canada. Classics is also the best preparation for the study of non-European cultures (Chinese, Indian, Islamic, etc.), and there is a growing need for specialists in these fields. For the older history of philosophy, and for the history of Christian belief until, and including, the Reformation, a knowledge of classics is indispensable. The same may be said for mediaeval studies in general. Classics leads also to ancient Near Eastern Studies (Jewish, Babylonian, Egyptian, etc.) and to archeology.

Degree Programs

BA and BSc

Of classes offered by the department, Classics 1010, 1020, 1030, 2000 and 2070 and those classes in Ancient History and Religions and Ancient and Mediaeval Philosophy not having a Language prerequisite should be especially useful to students taking a bachelor's degree. All classes beyond the 1000 level are available for *major and minor programs* in classics, and the Department is glad to assist students in working out programs according to their interests.

Honours Programs

The candidate may choose between three programs: BA with Honours in Classics (Ancient Literature), BA with Honours in Classics (Ancient History), or BA with Honours in Classics (Ancient Philosophy). *In each case, it is highly desirable, but not essential, that the student begin the study of at least one of the classical languages during the first year of study.* For purposes of meeting grouping requirements, Ancient History and Ancient and Mediaeval Philosophy classes may be counted either as Classics credits, or as History and Philosophy credits, respectively.

To receive an Honours degree in Classics:

Students must complete nine to eleven classes in Classics beyond the 1000 level chosen in accord with the general Faculty regulations for Honours.

The program must include work in either Greek or Latin Language and Literature to the 3000 level and work in the other language to an appropriate level as determined by the Undergraduate Advisor.

The program must be approved by the Undergraduate Adviser.

Whether the Honours degree is awarded in Ancient Literature, History or Philosophy depends on the area of the Department's offerings in which a larger part of the work is done.

Combined Honours

Classics may be taken as part of a combined honours program with French and German. Students interested in either of these programs should consult with the chairmen of the respective departments.

Undergraduate Adviser

The programs of all students majoring or honouring in the Department must be approved by the Undergraduate Adviser. Currently, Professor Starnes holds the position.

Changes and Additions

As the Calendar goes to press before all plans for the next academic year are completed, there may be significant changes in the classes listed below. Students should consult the Department for names of instructors and revisions.

Classes Offered

Literature, History and Philosophy, Art Archaeology and Mythology

Note: The Introductory classes, and the more elementary classes in Ancient History and Religions, and Classical Philosophy listed below do not require knowledge of the ancient languages. However, students who plan to do advanced work in any of these areas are advised to begin study of the appropriate languages as early as possible.

Introductory: Origins of the West

Classics 1010 Ancient History: An Introduction to the Cultural History of the Ancient World: lecture 2 hours, D.K. House. The first term is devoted to a study of the major pre-classical civilizations (Sumer, Egypt, etc.) with attention paid to the art, religion and social forms of these cultures as well as their political development; in the second term the civilizations of Greece, Rome, and Israel are studied, and their issue in the Early Christian world considered. As the class is intended as an introductory one, no special preparation is expected, and there is no foreign language requirement.

Classics 1020 Archeology and Art: lecture 2 hours, W.J. Hankey, J.P. Atherton, P.F. Kussmaul. A study of Greco-Roman civilization through its visual art. The class will cover the period from 800 BC to AD 800. This is an introductory class; no special preparation is expected and there is no foreign language requirement.

Classics 1030 Origins of Western Thought: Introduction to Ancient Philosophy: lecture 2 hours, J.P. Atherton, W.J. Hankey. An introduction to classical culture through a study of its philosophical ideas. The ideas are presented in the religious, literary, and social context of their historical development.

Classics 2000 Classical Literature: lecture 2 hours, R. Friedrich, R.D. Crouse, C.J. Starnes and others. An introduction to classical civilization by way of the literature, read in English translations. Authors studied are Homer, the Greek Dramatists, Plato, Vergil and St. Augustine. *This class is open to first year students.*

Classics 2100 Classical Mythology: lecture 2 hours, A.M. Johnston. This class is designed as an introduction to the mythology and religion of ancient Greece and Rome. First the major gods and goddesses, their worship and their myths will be studied; then the major cycles of Greek and Roman heroic mythology (the Trojan War, the Argonaut expedition, the cycles centering on Hercules, Perseus, Theseus and Aeneas) as they were recounted

in Vergil, Ovid and in the visual arts. This class is also *open to first year students.* All texts read in translation.

Ancient History and Religions

Classics 2200 Ancient History: The Ancient City: lecture 2 hours, P.F. Kussmaul. An introduction to Ancient History through a study of the constitutions of the Greek city states (especially Athens) and of Rome. Basic texts, such as Aristotle's *Athenian Constitution*, are read in English translation. This class is open to first-year students. There is no foreign language requirement. This class is given alternately with 2210.

Classics 2210 Roman History: The Roman Empire and the Rise of Christianity: lecture 2 hours, P.F. Kussmaul. A continuation of the introduction to Ancient History through a study of the institutions and constitutional arrangements of the Roman Empire from the time of Augustus. The relation of the Empire to Christianity is a topic of primary interest. This class is given alternately with 2200.

Classics 2220 Greek History: lecture 2 hours, D.K. House. Given alternately with Classics 2230.

Classics 2230 Roman History: The Cultural History of the Roman World: lecture/seminar 2 hours, D.K. House. Given alternately with Classics 2220.

Classics 3280/5280 Christian Beginnings and the Early History of the Church: seminar 2 hours, E. Segelberg. The study of the beginnings of the Christian Church against its Jewish background within the Hellenistic culture. The history of the Church is followed up through the first 3-4 centuries. Emphasis in alternate years on various features such as the development of Christian Initiation, the Eucharist or Ministry and Authority.

Classics 3290/5290 Greek Religion: seminar 2 hours, E. Segelberg. The history of Greek Religion, with particular attention to the interpretation of myth.

Classics 3260/5260 Roman Religion: seminar 2 hours, E. Segelberg.

Classics 3270/5270 Near Eastern Religion: seminar 2 hours, E. Segelberg.

Classics 3520/5520 Seminar on Problems of the Hellenistic period: seminar 2 hours, E. Segelberg. Religions in the Hellenistic Period.

Classics 4530/5530 Seminar on the Roman Empire and the Rise of Christianity: seminar 2 hours, J.P. Atherton, P.F. Kussmaul. Selected topics from the transition from Classical to Christian culture are studied. Particular attention is paid to the connection between religious innovation and the effect of the new beliefs on literature, art and philosophy.

Classical Literature

Classics 3510 Ancient and Modern Drama: (same as Comparative Literature 3510) seminar 2 hours, R. Friedrich. This class is a study of Western drama from its ritual beginnings in ancient Greece to its 20th-century forms. The first part deals with Greek theatre: the ritual origins of drama, the Dionysian festivals, production and stage conventions. This is followed by a study of Greek and Roman tragedies and comedies, accompanied by a reading of Aristotle's *Poetics* and Horace's *Art of Poetry*. In the second part the influence of the ancients on the formation of European drama and dramatic theory is traced by a study of a number of plays ranging from Shakespeare to 20th-century drama, each representing a type, or period, of European drama. All plays (and other texts) will be studied in translation.

Classical Philosophy

Classics 3300/5300 History of Christian Doctrine to Augustine: lecture 2 hours, C.J. Starnes, W.J. Hankey. The meaning of Christian doctrines in

relation to their Jewish and Greek origins and their development in the classical world. The basic text is Augustine, *The City of God*.

Classics 3360, Ancient Philosophy from its Beginning to the Sixth Century AD: (same as Philosophy 3360) lecture 2 hours, W.J. Hankey, J.P. Atherton. A survey of the whole history of ancient Greek philosophical thought from its beginnings in Ionia in the sixth century BC to the end of the public teaching of Greek philosophy by non-Christians in the sixth century AD. Proper attention is paid to the great classical philosophies of Plato and Aristotle studied in their historical context; and much emphasis is laid on the Greek philosophy of the first centuries AD and its influence on developing Christian thought.

Classics 3370/5370 History of Christian Doctrine II: From Augustine to Calvin: W.J. Hankey, A.M. Johnston. The class considers the theological development of matters like the Trinity, Incarnation, predestination, the nature of man and the sacraments by mediaeval thinkers.

Classics 3380 Mediaeval Philosophy: (same as Philosophy 3380) lecture 2 hours, R.D. Crouse. A study of the development of philosophy in the formative age of European civilization related to political, institutional, literary and theological concerns. An attempt is made to show how legacy of classical and Christian antiquity was appropriated and reformed to constitute the ideology of mediaeval Christendom. The lectures are devoted mainly to the study and discussion of a few fundamental texts, beginning with Boethius' *Consolation of Philosophy*. Special attention is given to Anselm's *Proslogion* and the first few questions of Thomas Aquinas' *Summa*. It is the object of lectures to present the continuity of the historical development and to emphasize broad implications of the philosophical doctrines presented in the texts. In the later part attention is given to late mediaeval Platonism and Mysticism, to show something of the Reformation and modern philosophical and religious thought.

Classics 3400 The Dialogues of Plato: seminar 2 hours, D.K. House. This class presupposes some knowledge of the history of Ancient Philosophy, and some of Greek. Given alternately with Classics 3500.

Classics 3410 St. Augustine's Confessions: Seminar 2 hours, C.J. Starnes. This class presupposes some knowledge of the history of Ancient Philosophy, and of some Latin. This class is given alternative with Classics 3420.

Classics 3420 St. Augustine's City of God: seminar 2 hours, C.J. Starnes. This class is given alternatively with Classics 3410.

Classics 3450/German 345 Hegel's Philosophy of Nature: J.A. Doull, W.J. Hankey. Hegel's Philosophy of Nature and its relation to ancient physics and modern science. The class endeavours to discover in what sense a thinking of nature in essential continuity with ancient physics is currently possible or in what sense modern natural science constitutes a philosophy of nature.

Classics 3470, Reading and Research: Ancient Literature

Classics 3480, Reading and Research: Ancient History

Classics 3490, Reading and Research: Ancient Philosophy

Classics 3500 Aristotle: seminar 2 hours, J.A. Doull, D.K. House, W.J. Hankey. This class studies a treatise of Aristotle, usually the *De Anima* or the *Physics*. It presupposes some knowledge of Ancient Philosophy and some knowledge of Greek.

Classics 4200/5670 Ancient Practical Philosophy: seminar 2 hours, J.A. Doull, W.J. Hankey.

Classics 4300/5600 Seminar on the Philosophy of Aristotle: seminar 2 hours, J.A. Doull, W.J. Hankey.

Classics 4310/5610 Seminar on the Philosophy of Plato: seminar 2 hours, J.A. Doull.

Classics 4320/5620 Ancient and Modern Dialectic: seminar 2 hours, J.A. Doull. Dialectical method in Fichte, Schelling and Hegel in relation to Plato and Aristotle.

Classics 4400/5700 Seminar on the Philosophy of the Church Fathers: R.D. Crouse.

Classics 4450/5640 Mediaeval Interpreters of Aristotle: seminar 2 hours, J.P. Atherton, R.D. Crouse, W.J. Hankey.

Classics 4500/5800 Seminar on Neoplatonism: seminar 2 hours, J.P. Atherton, W.J. Hankey, D.K. House. Topics from the history of Neoplatonism and its relation to the theology of the Greek Church are studied.

Classics 4580/5580 Reading and Research

Classics 4680A/4690B Reading and Research

Classics 4900/5900 Departmental Seminar: seminar 2 hours.

Classical Languages and Literature

Greek 1000 Introductory Greek: lecture 3 hours, P.J. Calkin, R. Friedrich. This is the beginner's class in the Greek language, and no previous knowledge is required. The aim is to teach the student to read a Greek text. After he has become accustomed to the new alphabet — which does not take long — the study of grammar is introduced along with reading and translation of texts from original Greek literature.

Greek 2000 Intermediate Greek: lecture 3 hours, P.J. Calkin. Greek 2000 is a continuation of Greek 1000. The aim is to develop the student's ability and to read and translate prose as well as poetic Greek texts.

Greek 3000 Advanced Greek: seminar 2 hours, J.A. Doull, D.K. House, R. Friedrich. Prerequisite: Greek 2000. This class which reads both a prose and a poetic work is the normal third class in Greek.

Greek 3010/5010 Greek Epic: seminar 2 hours, R. Friedrich. Prerequisite: Greek 2000.

Greek 3020/5020 Greek Lyric: seminar 2 hours, staff. Prerequisite: Greek 2000.

Greek 3030/5030 Greek Drama: Tragedy: seminar 2 hours, R. Friedrich. Prerequisite: Greek 2000.

Greek 3040/5040 Greek Drama: Comedy: seminar 2 hours, R. Friedrich. Prerequisite: Greek 2000.

Greek 3050/5050 Greek Philosophical Texts I: seminar 2 hours, staff. Prerequisite: Greek 2000.

Greek 3060/5060 Greek Philosophical Texts II: seminar 2 hours, staff. Prerequisite: Greek 2000.

Greek 3070/5070 Greek Philosophical Texts III: seminar 2 hours, staff. Prerequisite: Greek 2000.

Greek 3080/5080 Greek Historians: seminar 2 hours, staff. Prerequisite: Greek 2000.

Greek 3090/5090 Greek Literary Criticism: seminar 2 hours, R. Friedrich. Prerequisite: Greek 2000.

Greek 3100A & B Reading and Research: seminar 2 hours, staff. Prerequisite: Greek 2000.

Greek 3120 Biblical Greek: This class enables the student who already knows the basics of Classical Greek to familiarize himself with *koine*-Greek as it is found in various *New Testament* authors. The Greek of the *Septuagint* will also be taken into account.

Greek 4100/5100A/B Reading and Research: staff. Prerequisite: any 3000-level class.

Latin 1000 Introductory Latin: lecture 3 hours, C.J. Starnes. An introduction to Latin through the study of its basic grammar.

Latin 2000 A Study of Latin Prose and Poetry: lecture/discussion 2 hours, P.F. Kussmaul. A study of the poetry and prose literature of Rome through a selection of texts: particular attention is paid to improving the students' command of the grammar and syntax of the Latin language.

Latin 2040 Latin Philosophical Texts: lecture 2 hours, R.D. Crouse. Prerequisite: Latin 1000 or Senior Matriculation in Latin. The purpose is to give students experience in reading philosophical Latin. Various authors are read from Cicero to the late Middle Ages.

Latin 2060 Latin Historical Texts: lecture 2 hours, J.P. Atherton.

Latin 3500/5500 Roman Satire: seminar 2 hours, staff.

Latin 3510/5510 A Study of Vergil: seminar 2 hours, J.P. Atherton. Prerequisite: A class in Latin at the 2000 level. A study of the development and importance of Vergil's basic themes and ideas embodied in the *Aeneid*. In the first part of the class special attention is given to his early work the *Bucolics*, where his themes begin to appear, and their development is then followed through the relevant parts of the *Georgics*. The main part of the class is devoted to the reading and discussion of the chief themes of the *Aeneid*, especially as they illustrate Roman political, religious and social ideas which have greatly influenced our own beliefs and institutions.

Latin 3520/5520 Advanced Reading in Latin Literature: staff.

Latin 3600/5600 Latin Religious Poetry: seminar 2 hours, J.P. Atherton, P.F. Kussmaul. A study of religious poetry written in the Latin language from the *Carmen Saliare* (680 BC) to Calvin's *Epinicon* (1544 AD) and the poems of Leo XIII (1890 AD).

Latin 4000/5000 Reading and Research: staff.

Latin 4050/5050 Reading and Research: staff.

Near Eastern Languages

The classes in Hebrew, Coptic, Syriac and Arabic, are available as electives at the discretion of the Department, only in relation to the needs of the particular student.

Note: The classes in Hebrew and Arabic are taught by the Atlantic School of Theology.

Hebrew

1010 Elementary Hebrew and Introductory Readings

2020 Intermediate Hebrew

3030 Advanced Hebrew

Coptic

1010 Introduction to the Coptic (Sahidic) Language and Literature: E. Segelberg.

2000 Reading of Selections from other Coptic Dialects: E. Segelberg.

3010 Selected Coptic Texts: E. Segelberg.

4020/5020 Reading of Coptic Texts: E. Segelberg. Partly Nag Hammadi Papyri, and partly Manichaean texts.

Syriac

1000 Introduction to the Syriac Language and Literature: E. Segelberg.

2000 Syriac Language and Literature: E. Segelberg. Reading of some early writers such as Aphrates and Aphrem, the famous hymnographer.

3000 Advanced Syriac: E. Segelberg. Reading of selected Patristic texts.

Arabic

Students wishing to take a class in Arabic must consult with the Department before registering for the class.

1000 Introductory Grammar and Reading of Texts

2000 Intermediate Arabic

Special Topics

Classics 4910A/4920B Special Topics

Greek 4910A/4920B Special Topics

Latin 4910A/4920B Special Topics

Comparative Literature

A. Andrews (Theatre)
 J.A. Barnstead (Russian)
 S.A.M. Burns (Philosophy)
 R. Friedrich (Classics) (Chairman)
 F. Gaede (German)
 R.M. Huebert (English)
 S. Jones (Spanish)
 J.M. Kirk (Spanish)
 R.M. Martin (Philosophy)
 S. Mendel (English)
 H.R. Runte (French)
 M.C. Sandhu (French)
 H.G. Schwarz (German)
 H.S. Whittier (English)

Comparative Literature, despite its name, is not so much defined by 'comparisons' as by studies involving literary works which belong to more

than one literature and language. The idea of a national literature (English literature, French literature, Canadian literature, etc.) is of relatively recent date. It originated in the 18th century with the rise of national consciousness; yet at the same time the traditional broad unity of all literatures reasserted itself in Goethe's concept of 'world literature.' In Comparative Literature the literary work is treated in its double aspects of belonging to a national literature as well as forming part of world literature. Comparative Literature has various approaches. It implies the study of *themes and motifs* (e.g. Faust, myths, etc.) as they recur in literary works of different ages and literatures; of *literary genres* such as drama, epic or romance; of *periods* (e.g. Renaissance, 18th century, etc.); of authors writing in different languages but linked by influences; of the *reception* of the work of an author in another literature (e.g. Shakespeare in Germany). The relationships of literature to the other arts (e.g. film, the fine arts, music, etc.) may also be a subject of Comparative Literature; and last but not least, Comparative Literature forms a bridge between literature and other fields in the humanities such as philosophy, religion, and politics.

The Departments of Classics, English, French, German, Philosophy, Russian, Spanish and Theatre offer the following classes in Comparative Literature. Classes which are cross-listed may form part of an area of concentration. All lectures are given in English and works are read in English translation unless otherwise noted.

Classes Offered

Classes marked * are not offered every year. Please consult the current timetable on registration to determine if this class is offered.

Note: At present the Comparative Literature Program is being fundamentally revised; the entries may therefore be outdated at the time when this Calendar will be published. Students interested in the Comparative Literature Program should contact R. Friedrich, Classics Department, 424-3468; or H.R. Runte, French Department, 424-2430.

*100 **Introduction to Comparative Literature:** This is an introduction to the understanding of man's approach to the problems of life through the study of selected masterpieces of European literature which may include works by Dante, Chaucer, Cervantes, Shakespeare, Molière, Goethe, and others. Note: English 100 or Classics 2000 is acceptable as an equivalent to Comparative Literature 100.

201 **The History of the Theatre:** A. Andrews. This class is cross-listed as Theatre 2010.

203 **Masterpieces of Western Literature:** H.S. Whittier. This class is cross-listed as English 203.

204 **The European Novel:** S. Mendel. This class is cross-listed as English 204.

*210 **Theories and Manifestations of Love in Medieval Europe:** H.R. Runte. A literary and anthropological study of major poetic, romanesque, and dramatic works by English courtly poets, French troubadours, and German Minnesanger, with special emphasis on their relation to our time.

*212 **Realism and the 18th Century English and French Novel:** R. Runte. Novels by such authors as Marivaux, Richardson, Prévost, Fielding, Rousseau, Diderot, Smollett, and Laclos are studied. Aspects of realism in style and structure provide the basis for comparison/contrast of the works read.

*214 **Arthurian Romances:** H.R. Runte. A historical, archaeological, cultural and literary investigation of French, English, and German Arthurian texts dealing with the medieval legend of King Arthur and the Knights of the Round Table. All readings in modern English translations.

218 **Germanic and Greek Mythology:** This class is cross-listed as German 235.

237 **Restoration and 18th Century Comedy:** R. Runte. A comparative study of English and French plays by such authors as Wycherley, Etherege, Congreve, Steele, Sheridan, Molière, Lesage, Marivaux, Voltaire, and Beaumarchais. Critical essays on comedy are studied with a view to defining the universal, national and temporal nature of comic elements in the works read.

270 **Philosophy in Literature:** R.M. Martin. This class is cross-listed as Philosophy 270.

350 **The Modern Theatre:** A. Andrews. This class is cross-listed as Theatre 3500.

351 **Ancient and Modern Drama:** R. Friederich. This class is cross-listed as Classics 3510.

490 **Dramatic Theory and Criticism, and the Aesthetics of the Theatre:** A. Andrews. This class is cross-listed as Theatre 4900.

Computing Science

EXT DIV.
2375
6100 UNIV. M.

There are a variety of programs now offered leading to a BA or BSc with a concentration in Computing Science.

Computing Science as an area of Concentration

Students who plan to major in Computing Science should arrange a program in consultation with the Department of Mathematics, Statistics and Computing Science.

Majors in Computing Science must obtain at least four (and no more than eight) credits beyond the 1000 level in Computing Science.

In addition to the necessary first year prerequisites (i.e. Math 1000, Comp. Sci. 1400, 1410) the following classes are required in all programs:

2nd year: CS 2450, CS 2610

3rd year: CS 3690, CS 3700

It is strongly recommended that the following classes are also included in a program: 1st year Math 1010, 2nd year Math 2030, Math 2040, CS 2350, and CS 2270.

Computing Science 2350 is especially recommended for those interested in business or administrative computing and CS 2270 is especially recommended for those interested in science and engineering applications. At least one of CS 2350 or CS 2270 should appear in all major programs.

Students who wish to arrange inter-disciplinary programs (with fields such as Mathematics, Physics, Economics, Psychology and others) are invited to discuss their interests with the department.

Honours in Computing Science

The concentrated Honours program in Computing Science consists of:

1st year: Math 1000, Math 1010, CS 1400, CS 1410

2nd year: Math 2070, Math 2080, Math 2130 or (Math 2030, Math 2040), CS 2450, CS 2350, CS 2610, CS 2270

3rd year: Math 3030, CS 3690, CS 3700

4th year: CS 8870, and two 4000 level CS courses.

For the purposes of Regulation 11.3, page 24, for this degree, Math 3030 and Math 2070, 2080 are counted as Computing Science courses, and consequently may not be counted toward a minor in Mathematics. All other faculty and departmental requirements must be satisfied. See the Director of Computing Science for program information.

Combined Honours

Students interested in taking honours in Computing Science and another subject as a combined program should consult the departmental chairman through whom a suitable course of study can be arranged.

A combined honours program may well be an appropriate choice for many students. If a student is contemplating graduate work, it should be borne in mind that the work in either subject of a combined honours program may be insufficient for entry to a regular graduate program, and that a qualifying year may be necessary.

Cooperative Education Programs

The department offers two Co-op education programs involving Computing Science, a concentrated program in Computing Science and a combined program with Mathematics. Both these programs are Honours programs. Students enrolled in the Computing Science Co-op are required to take all the courses Computing Science honours students are required to take.

Further information about the Co-op programs is included under the Calendar entry for Mathematics. Interested students should note that some Departmental regulations for Co-op students differ from those regulations affecting straightforward Honours students.

Any student who is interested in enrolling in a Co-op program is urged to contact the Director of Co-op Education as early as possible in their academic career for course advice and other information.

Other Information

The Department now operates a VAX-750 Unix system for Computing Science students. The terminals are located in the Killam Library. In addition, a VAX-780 Unix system is available for faculty and graduate students.

Students who complete the first two years of a Dalhousie program in Computing Science may complete their programs at Dalhousie or may be able to transfer to the Technical University of Nova Scotia (TUNS) to complete a Bachelor of Computing Science with Engineering options. Further information about the classes required for admission to a TUNS program may be obtained from the Department of Mathematics, Statistics and Computing Science or TUNS.

A student may not receive credit for both CS 1400 and Engineering 240 or either of the previous classes Math 225 (in 1978-79) or CS 240. The latter two classes may be used instead of CS 1400 as prerequisite for further CS classes.

A student may not receive credit for both CS 1410 and the previous class CS 240 in 1978/79. Whenever CS 1410 is a prerequisite the latter serves instead. Note that credit may not be obtained for the same class twice even if the number has been changed (e.g. 2610 is the same as the former 360).

Classes Offered

1400A/B Introduction to Computing Science: lecture 3 hours, tutorial 1 hour. Prerequisites: Nova Scotia Math 441 or equivalent. This class together with CS 1410 provides a general introduction to algorithmic concepts, structured programming, and Computing Science. Students develop program-

ming skills in a higher-level language such as cobol 74, Pascal or Fortran 77, with emphasis on structured programming. The exercises involve primarily non-numerical tasks including character manipulation and sequential file processing.

1410B Applications and Algorithms: lecture 3 hours, tutorial 1 hour. Prerequisites: CS 1400 and Math 1000. This is a continuation of CS 1400. The applications tend to be more mathematical and include numerical calculations with truncation and rounding errors, statistics, modeling and simulations, data processing, non-numerical applications involving networks and graphs, interpreters and translators. Students are introduced to elementary data structures and algorithm analysis.

2270B Introduction to Numerical Linear Algebra: lecture 3 hours (same as Mathematics 2270B). Prerequisites: Math 1010, 2030 and CS 1410 (with a grade of B- or better). We begin by examining the floating point number system and its arithmetic. Next, we investigate the numerical solution of systems of linear equations, examining Gaussian Elimination and some iterative methods. The idea of condition numbers, both of a problem and an algorithm, is introduced, together with some techniques of estimating the condition number of a matrix. The Singular Value Decomposition of a matrix and generalized inverses are also examined. The Modified Gram Schmidt process, the solution of undetermined linear systems, and overdetermined linear systems using a least squares approach, are discussed. Reference is also made to various software libraries available, including LINPACK. Time permitting, interpolation is also discussed.

2350B Introduction to File Processing: lecture 3 hours. Prerequisite: CS 2610 (with a grade of C- or better). This class begins with a review of sequential file algorithms. However, the primary subject is direct-access file systems and the various access methods. Some of the theoretical topics covered include hashing and tree data structures appropriate for file directories. Internal and external sorting methods are covered in considerable detail.

2450A Introduction to Computer Systems: lecture 3 hours Prerequisite: CS 1410 (with a grade of B- or better). An introduction to machine architecture from the perspective of an assembly language programmer. Students gain familiarity with an assembly language and the translation process needed to produce machine code. Common addressing modes, macros and file I/O are discussed, together with the internal structure of memory, control units and processing units.

2610A (formerly 360) Data Structures and Algorithmic Analysis: lecture 3 hours. Prerequisite: CS 1410 (with a grade of B- or better). Data types and the operations on them are covered in this class, including stacks, queues, trees and various linked structures. The efficient representation of graphs and the corresponding algorithms are discussed. Considerable emphasis is placed on the analysis of algorithms.

3040A/B Introduction to Computer Organizations: lecture 3 hours. Prerequisite: CS 2450 (with a grade of C- or better). An introduction to logic design and detailed computer architecture. Basic logic elements such as gates and flip-flops are discussed and the design of combinational networks, registers and control mechanisms analyzed. Internal representation and arithmetic, communication between components, instruction fetch and sequencing, interrupts and I/O controllers are also discussed.

3090A/B Computers and Society: lecture 3 hours. Prerequisite: CS 1410 (with a grade of B- or better). The impact of computers on society is discussed in this class. Topics include the history of computing and technology, the place of the computer in modern society, legal issues such as the copywriting of software, the computer scientist as a professional, the impact of databanks on individual privacy and the public perception of computers and computer scientists.

3210A (formerly part of 320) Introduction to Numerical Analysis: lecture 3 hours (same as Mathematics 3210A). Prerequisites: Mathematics 2000 and CS 2270. See class description for Mathematics 3210A.

***3220B Numerical Solutions of Ordinary Differential Equations:** lecture 3 hours (same as Mathematics 3220B). Prerequisites: CS 3210 and Mathematics 3110, 3090. See class description for Mathematics 3220B.

3250A/B Data Base Management Systems Design: lecture 3 hours Prerequisites: CS 2610, CS 2350 (with grades of C- or better). The concepts and structures necessary to design and implement a data base management system are stressed. Hierarchical, network and relational models are discussed with emphasis on the necessary logical and data-structures. Various normal forms and canonical schema are discussed as well as the concepts of relational algebras and relational calculus.

3690A (formerly 270) Programming Languages: lecture 3 hours. Prerequisite: CS 2610 (with a grade of C- or better). The emphasis is on fundamental concepts such as block structure and recursion and structured control flow. Exercises are given in several languages such as Algol or Pascal, Snobol, Lisp and APL. On completion of this class students should be competent programmers, able to program in any language given appropriate reference material.

3700A/B Operating Systems I: lecture 3 hours. Prerequisite: CS 2610, 2450 (with a grade of C- or better). Recommended: Mathematics 2070-2080. This class covers the principles of modern operating system design with examples from existing systems. Specific topics include: concurrent processes, interprocess communication, synchronization, scheduling policies, multi-level storage management, and associated algorithms.

***3750B Artificial Intelligence:** lecture 3 hours. Prerequisite: CS 3690 (with a grade of C- or better). An introduction to basic concepts and techniques of artificial intelligence or systems with insights given into active research areas and applications. Representational issues and notational structures are emphasized and existing systems are surveyed. Students work on a fairly large project using Lisp.

3810B (formerly Physics 421) Microcomputers in the Real World: lecture 3 hours (same as Physics 3810B). Prerequisites: CS 2450 (with a grade of C- or better), Physics 2200A/2210B or 2110/2120. See class description for Physics 3810B.

***4100A/B Operating Systems II:** lecture 3 hours. Prerequisites: CS 3700B (with a grade of C- or better), Mathematics 2070-2080. A further development of the material of Operating Systems I. Topics include concurrent processes, address space management, resource allocation, multiprogramming systems, protecting access to objects, pipelining, user interfaces and networks.

***4130A/B Analysis of Algorithms:** lecture 3 hours, same as Math 4130 A/B. Prerequisite: CS 3690 (with a grade of C- or better). This class covers algorithmic solutions to a wide variety of problems and a formal analysis of their complexity. It is a continuation of the 2610 class. Problems are taken from combinatorics and numerical computation including algorithms for unordered and ordered sets, graphs, fast multiplication, prime testing, factoring, polynomial arithmetic and metric operations. Other topics include the analysis of algorithms used in systems programming and artificial intelligence such as pattern matching for text processing and algorithms in natural language processing.

***4140A/B Software Design and Development:** lecture 3 hours. Prerequisite: CS 3690 (with a grade of C- or better). This class involves a formal approach to state-of-the-art techniques in software design and development. Students work in teams in the organization, development and management of a large software project. Formal models of structured programming, stepwise refinement and reorganization, top-down design, strength and coupling measures, milestones and estimating, chief-programmer teams, program libraries and documentation are included.

***4150A/B Theory of Programming Languages:** lecture 3 hours. Prerequisite: CS 3690 (with a grade of C- or better). This is a class in the formal treatment of programming language translation and compiler design concepts. Topics include lexical analysis and parsing with emphasis on the theoretical aspects of parsing context-free languages, translation specification and machine-independent code optimization. Finite state grammars, lexical scanners, and context-free parsing techniques such as LL(k), precedence, LR(k), SLR(k) are included.

***4200A/B Selected Topics in Artificial Intelligence:** lecture 3 hours. Prerequisite: CS 3750 (with a grade of C- or better).

***4270A/B Numerical Software:** lecture 3 hours. Prerequisite: CS 3210 (with a grade of C- or better). The design and implementation of reliable programs and libraries for numerical computation are the foci of this class. Program libraries such as EISPAC, LINPAC and IMSL are reviewed. Particular attention is paid to the choice of subroutine parameters and the tradeoffs between convenience, simplicity and generality.

***4350A/B Topics in Computer Science:** lecture 3 hours. Prerequisites: Three 3000 level CS courses (with a grade of C or better).

***4700A/B Advanced Topics in Data Base Design:** lecture 3 hours. Prerequisites: CS 3250 (with a grade of C- or better).

***4660A/B Automata and Computability:** lecture 3 hours (same as Mathematics 4660A/B). Prerequisites: CS 1410, a 3000 level Mathematics class such as 3030. This class deals with finite state, pushdown and linear bounded automata; their correspondents in the Chomsky hierarchy for formal grammars and Turing machines. Appropriate closure properties and non-determinism are discussed as well as computable and noncomputable functions and the Halting problem.

8700 (non credit) Co-op Seminar

8701 (non-credit) Co-op Seminar II

8870C Honours Seminar

8891 Co-op Work Term I

8892 Co-op Work Term II

8893 Co-op Work Term III

8894 Co-op Work Term IV

Economics

Chairperson of Department

E. Klein

Professor Emeritus

Z.A. Konczacki, BSc (Lond.), B.Econ.Hons. (Natal), PhD (Lond.)

Professors

R.L. Comeau, BA, MA (St FX), PhD (Brown)

J.L. Cornwall, BA (Iowa), MSc (Lond.), PhD (Harv.) Coordinator of Graduate Studies

R.E. George, BSc (Lond.), MA (Brist.), PhD (Lond.) William A. Black Professor of Commerce

J.F. Graham, BA (UBC), MA, PhD (Col.), FRSC Fred C. Manning Professor of Economics

E. Klein, LL.M. (Buenos Aires), MSc (Dal), Dr.Rer.Pol. (Hamburg)

C.T. Marfels, Dr.Rer.Pol. (Berlin)

R.I. McAllister, MA (Oxon.), MA (Cantab.)

N.H. Morse, BA, MA (Acad.), PhD (Tor.)

A.M. Sinclair, BA (Dal), MA, B.Phil. (Oxon.), PhD (Harv.)

Associate Professors

F.M. Bradfield, BComm (McM), PhD (Brown)

M.G. Brown, BA (W.Ont), MA (Queen's), AM, PhD (Chi.)

P.B. Huber, BA, MA, PhD (Yale)

G. Kartsaklis, CE (Athens), Dr.Rer.Pol. (Bonn)

B. Lesser, BComm (Dal), MA, PhD (Corn.)

L. Osberg, BA Hons (Queen's), MPhil, PhD (Yale)

U.L.G. Rao, MA, MSc (Andhra), PhD (W.Ont.)

Assistant Professors

M.L. Cross, BA (Montana), MA (SFU), PhD (Texas A&M.)

S. DasGupta, BA (Calcutta), MA (Delhi), MA, PhD (Rochester)

D. Gordon, BA Hons (Lethbridge), MA (Saskatchewan), PhD (UBC)

B.M. Jamieson, BA (UBC), MA, PhD (Tor.)

R.L. Mazany, BSFS (Georgetown), PhD (UBC)

Special Lecturers

T.H. O'Neil, BA, MA (Dal)

T.A. Pinfold, BA, MA (W.Ont.), PhD (Minn.)

Economics is a social science — a science because it involves a rigorous intellectual effort to derive logical conclusions from basic facts and propositions; a social science because it has human beings and their welfare as its ultimate concern. The basic facts of Economics cannot be knowable and measurable with the same precision as those of the physical sciences — human society and its motivations are far too complex to permit this — but none of the sciences surpasses economics in its relevance to our needs and problems and goals. Economic man is rational man consuming, organizing and producing within a framework of laws and customs in an effort to use the limited resources of our world efficiently for the greatest satisfaction. It is not an easy science; indeed it is one of the most complex, difficult (and fascinating) areas of study you could choose in the university when you pursue it beyond its elementary levels, but some basic knowledge of economics is essential for any educated person. A more extensive knowledge of the subject is an invaluable complement to other fields of specialization such as law, commerce, politics and other studies in social sciences or humanities—and a specialization in the field can lead to a variety of interesting career opportunities.

Degree Programs

BA Degree Program (Three Years)

Students choosing to major in economics at the undergraduate level may do so in the three-year BA Program or they may seek a higher level of specialization in the four-year Honours Program. Several combined programs may also be arranged with economics as the major or minor subject in association with such other fields as political science, sociology, history, geology, biology, mathematics— and possibly others.

Final program approval for all majors' students must be obtained from the appropriate coordinator.

General Principles: The following program arrangements are provided to the students as guidelines to facilitate the selection of classes appropriate to particular areas of interest. They should not, however, be construed as straitjackets nor as a reason for not seeking individual guidance from faculty members. In suggesting such program frameworks, two principles have particular weight: (a) students taking economics as a major, or in an honours program, should strike a balance between breadth of coverage among disciplines and depth of specialization in economics; (b) students taking economics as a minor or as a component of another specialization, such as commerce, should be allowed a reasonable degree of flexibility in their choice of economics classes.

General Format: Requirements for a major in economics can be satisfied by taking Economics 1100 or equivalent and any four other full-year classes, or equivalent, in economics. However, a student who desires to take a major in economics with more than the minimal requirements should undertake a program of study along the following lines:

Year 1: Principles of Economics; Mathematics 1000/1010, or equivalent (usually Mathematics 1100); and three classes in fields other than Economics.

Year 2 and 3: A minimum of 5 and a maximum of 8 classes in Economics; Classes in Political Science, History, Mathematics and other related subjects are to be taken to bring the total of classes over the three-year period to 15.

No more than one credit will be given for Economics 1100, 1105B and 1120. For persons considering an honours degree, or any advanced work in economics, intermediate micro and macroeconomic theory classes and intermediate statistics (Economics 2228 or equivalent) are mandatory. No more than one-half credit will be given for Economics 2200A/B and 2220A/B, or for Economics 2201A/B and 2221A/B

Specific Programs

Students wishing to take a set of classes which provide both depth and coherence in a particular area of economics should examine the following program suggestions:

Canadian Development Studies, Economic Analysis and Policy, Economics and the Citizen, Economics and Government, Economic Development in Historical Perspective, International Development Studies, Labour and Society, Mathematical Economics and Econometric Methods, Regional and Urban Economics, or Resources and Environment.

The details of these programs are in a brochure obtainable from the Department of Economics.

Students with interests not covered in the above-listed programs are encouraged to set up their own programs with the advice and approval of the Department. The Department is prepared to assist students who wish to devise their own programs under the present curriculum regulations. Interested students should consult the Undergraduate Coordinator.

BA Honours Degree Program (Four Years)

The necessary core classes for an Honours Degree in Economics are: Economics 1100; 2220 (A or B); 2221 (A or B); 4420A; 3321B; 2228; Mathematics 1000A/B and 2030A/B or equivalent; a class in Economic

History; a class in the History of Economic Thought. A minimum of nine classes in Economics, beyond the elementary level, is required.

The student's program is chosen in consultation with the Department and must have the approval of the Department. The 21st mark required for the honours program is based on an honours essay, graded on a pass/fail basis. Of the classes selected outside of economics in the third and fourth year, students must include at least two classes above the elementary level.

Since mathematics is required for graduate work in most good graduate schools, the value of econometrics and of additional mathematics is stressed. In some instances, the Department may permit students to take classes in other subjects in lieu of classes in economics and may permit minor variations in the required classes. Students must arrange their courses to ensure that they satisfy the overall requirements for the General BA degree.

Combined Honours

Combined honours programs may be arranged with other departments. Combined programs with Biology, Geology, History, Mathematics, Political Science or Sociology are available; others can be arranged by consultation. For combined honours programs with economics where the major concentration is in the other discipline, students should consult the other departments concerned.

Classes Offered

1100 Principles of Economics: lecture 3 hours, tutorial 1 hour (optional), various members of staff. For those lacking a background in economics, taken as the first in a series of classes in economics or as a background elective. Emphasis is on developing the basic analytical tools and applying them in the context of contemporary, and generally Canadian, economics problems. Section 5 of Economics 1100 offers a problem-oriented framework in which the analytical tools are developed by examination in each term of a specific question.

1101A/B* Principles of Microeconomics: lecture 3 hours, tutorial 1 hour (optional), various members of staff. Available only to students who have one half credit of introductory macroeconomics which is being transferred from another university, this class completes the principles of economics complement. Consult Department.

1102A/B* Principles of Macroeconomics: lecture 3 hours, tutorial 1 hour (optional), various members of staff. Available only to students who have one half credit of introductory microeconomics which is being transferred from another university, this class completes the principles of economics complement. Consult Department.

1105B* Principles of Economics: lecture 6 hours, tutorial 2 hours (optional), various members of staff. Available only to students who are enrolling for the first time in January or who are declared economics majors, in that order of priority. For description see Economics 1100. Consult Department.

1106A/B Introductory Statistics for Non-Mathematicians: lecture 3 hours. Prerequisites: Nova Scotia Mathematics or equivalent. For description see Mathematics 1060A/B.

1107A/B Statistical Techniques of Scientific Experimentation: lecture 3 hours. Prerequisites: Mathematics 1060. For description see Mathematics 1070A/B.

1120 Principles of Economics, A Historical Approach: lecture 2 hours, tutorial 1 hour, B. Lesser. Note: Economics 1120 is not open to Commerce students needing to satisfy their Economics 1100 requirements. Episodes from Canada's past, such as the economic factors leading to Confederation, the development of the Prairie wheat economy, the building of the CPR, the

beginnings of U.S. investment in Canada, and the Great Depression, are examined as a means of developing the basic analytical principles of economics.

2200A/B Intermediate Microeconomics: lecture 3 hours, various members of staff. Prerequisite: Economics 1100 or equivalent. An introduction to microeconomic theory and its applications which satisfies the minimum microeconomic theory requirements for majors and honours in economics. Of particular interest to Commerce students, or others not majoring in economics paying particular attention to applications of theory in a practical context. Microeconomic prerequisite for higher-level classes in economics. Note: Students may not take both 2200A/B and 2220A/B.

2201A/B Intermediate Macroeconomics: lecture 3 hours, various members of staff. Prerequisite: Economics 1100 or equivalent. Inflation, unemployment, exchange rate and related macro problems, with emphasis on Canadian policy experience in these areas. Of particular interest to commerce students or others not majoring in economics, serving as the macroeconomic prerequisite for higher-level classes in economics. Note: Students may not take both 2201A/B and 2221A/B.

2220A/B Microeconomic Theory: lecture 3 hours, (offered both terms). Prerequisite: Principles of Economics. Microeconomics deals with the economic behaviour of households as purchasers of output and suppliers of input services, and of firms as producers of outputs and purchasers of inputs, as well as with the behaviour of groups of households and firms. In addition to standard topics, an introductory treatment of general equilibrium, external economies, and welfare economics is included. Emphasis is on theoretical ideas, while applications of these ideas are also considered. Of particular interest to those planning to major or honours in economics. Note: Students may not take both 2200A/B and 2220A/B.

2221A/B Macroeconomic Theory: lecture 3 hours, (offered in both terms). Prerequisite: Principles of Economics. The various models that economists use to analyze an economy at the macroeconomic level are developed, showing how they relate to the formulation of macroeconomic policy. Of particular interest to those planning to major or to do honours in economics. Note: Students may not take both 2201A/B and 2221A/B.

2222A Economic Statistics I (same as Commerce 2501A/B): lecture 3 hours, workshop 2 hours, various members of staff. For description see Commerce 2501A/B.

2223B Economic Statistics II (same as Commerce 2502A/B): lecture 3 hours, workshop 2 hours, various members of staff. For description see Commerce 2502A/B.

2228 Intermediate Statistics: lecture 3 hours, U.L.G. Rao. The student is expected to have at least a one-year course in calculus (Math 1100 or 1000) and preferably linear algebra too. The basic theory of mathematical statistics. An introduction to econometrics, this class concentrates on the theory of probability, discrete and continuous probability models, mathematical expectation, moment generating functions, and statistical inference. The general linear model is also discussed. A critique of various problems that arise consequent to violations of the assumptions of the general linear model is presented as a preparation for applied econometric work and advanced work in econometrics.

2231A Health Economics: lecture and seminar 3 hours, M.G. Brown. Prerequisites: Principles of Economics; Economics 2220A/B is desirable. An examination of the allocation of resources to and within the health care sector of an economy. Characteristics claimed to be unique to the health care sector are analysed within an economic framework. Determinants of demand, supply and use of health services are examined with particular

reference to the organization and evolution of Canada's health care system. This one-term survey class consists of a literature review, lectures, and student seminar presentations on selected topics. To accommodate part-time students the class meets during late afternoon or evening, one day per week.

2232 Canadian Economic History: lecture 3 hours, N.H. Morse. As prerequisite, a class in economics principles and some knowledge of history would be beneficial. The development of Canada from the age of discovery to now, presented in relation to the larger system of the relationships between the Old World and the New. As the class proceeds, the focus shifts more and more towards Canada and more formal theory is introduced in discussing Canadian problems and policies, especially in the twentieth century.

2238A* The Industrial Revolution in Europe: lecture 2 hours, Z.A. Konczacki and P.B. Huber. Prerequisite: Introductory Economics or permission of Instructor. Transitions from preindustrial to industrial economies in England, France, Germany and Russia form a broad background for understanding the roots of contemporary society; of particular relevance for those interested in the economic history of Canada, the United States and other countries formerly part of a colonial system. Emphasis is on the economic, social, and technical changes of these industrial "revolutions" to disclose common elements in the experience of industrialization.

2239B* The European Economy in Historical Perspective: After the Industrial Revolution: lecture 2 hours, P.B. Huber and Z.A. Konczacki. Prerequisite: Introductory Econo Economics or permission of the Instructor. A self-contained class (may be taken separately from Economics 2238A) examining the contrasting development patterns of various industrialized European countries after their respective industrial revolutions and up to about 1960. Focus is on the development of hypotheses regarding the causes and effects of differences in the experience of growth of mature economies.

2241A* Comparative Economic Systems: National Economies: seminar 2 hours, P.B. Huber. Prerequisite: Introductory Economics. A detailed background of institutional material on the structure and performance of several economies is featured. Reading on specific countries provides the basis for several short papers. There is no written examination. A student taking this class must understand the interrelated character of economic activity and grasp the nature of the price system.

2242B* Comparative Economic Systems: Economic Organization and Planning: seminar 2 hours, P.B. Huber. Prerequisite: Introductory Economics, plus an additional half-class in Economics. The economic behaviour of organizations and the ways in which this can be controlled provide the basis for consideration of the theory and practice of economic planning at micro-economic and macro-economic levels in various institutional contexts.

2250 Applied Development Economics: seminar 2 hours and tutorials, R.I. McAllister. Prerequisite: Introductory Economics. Analysis of economic development theory and practice, with particular emphasis on developing countries and regions. There are three main elements: (1) policy and theory for economic development, focussing on foreign aid and regional aid; (2) development plans, budgets, and programs — lessons from experiences of agencies such as CIDA, CUSO, and the World Bank; (3) projects for development — drawing on case studies and first-hand field work. Experienced advisors from government and the private sector join the instructor during project visits.

3315A Labour Economics: lecture 3 hours, L. Osberg. Prerequisites: Economics 1100; Economics 2200 and 2201 (or equivalent) are recommended. The theory of labour markets is emphasized, in particular the aftermath of alternative viewpoints which seek to explain relative wages, unemployment and the allocation of labour.

3316B* Collective Bargaining and Labour Market Policy: lecture and seminar 3 hours, L. Osberg. Prerequisite: Economics 3315A. Topics covered are the theory and institutions of collective bargaining and current issues in labour market policy, e.g. discrimination, manpower planning, wage/price controls, impact of unemployment insurance or the negative income tax.

3317B* Poverty and Inequality: lecture and seminar 3 hours, L. Osberg. Prerequisites: Economics 1100; Economics 3315A is highly recommended. The extent of poverty and the distribution of income and wealth in contemporary societies are discussed. Most data are drawn from Canada but international evidence is introduced for comparative purposes. The theory underlying alternative measures and explanations of economic inequality are emphasized.

3324 Public Finance: lectures and seminar 3 hours, J.F. Graham. Prerequisites: Introductory Economics, Economics 2200A/B or 2220A/B and 2201A/B or 2221A/B are desirable. The principles of public finance and public policy, i.e. the economics of the public sector. The two major sections are (1) the theory of public goods and public expenditures and (2) the theory of public revenue, principally taxation. Other important areas are public borrowing, fiscal (stabilization) policy, and intergovernmental fiscal relations. Both normative and positive theory are considered. Particular attention is paid to the Canadian federal system, with its three levels of government: federal, provincial and municipal.

3326A Money and Banking: lecture 3 hours, R.L. Comeau. Prerequisite: Introductory Economics; Economics 2221A/B is desirable (complemented by Economics 4426B.) Deals with the nature and operation of the financial system, with particular reference to Canadian experience. It is concerned with financial instruments and institutions and the process of the social control of the supply of money and credit.

3327* History of Economic Thought: lecture 3 hours, N.H. Morse. Prerequisite: Economics-1100. Classes in micro- and macroeconomics are advised. The approach taken is to study 'the intellectual efforts that men have made in order to understand economic phenomena.' The presentation is largely non-mathematical; the main requirement is an ability to read and assimilate a certain body of literature rather quickly.

3328 Industrial Organization: lecture 2 hours, C. Marfels. Prerequisites: Economics 2200A/B or 2220A/B which may be taken concurrently. Students may also be admitted by permission of the instructor. The application of the models of price theory to economic reality. In any industry, the problems of a firm competing with its rivals in order to survive and acquire a higher market share are far more complex than those in price-theory where we have to deal with more or less simplified assumptions. The three main parts are: market structure, market conduct and market performance.

3330A/B* International Trade: lecture 3 hours, R.L. Mazany. Prerequisites: Introductory Economics and 2200A/B or 2220A/B. The causes of international exchange of goods and services are considered and the effects of international integration on the incomes and growth rates of national economies are analyzed. The theory and practice of commercial policy and other restrictions on trade are considered after the pure theory of international trade and its implications have been explored. Depending upon class interest and availability of time, the subjects of economic integration and of Canadian commercial policy may be discussed in some detail.

3332B Resource Economics: lecture 3 hours, N.H. Morse. Prerequisite: Introductory Economics. Economics 2220A/B is also desirable. This class focusses on economic theory pertaining to fisheries and the economic history of the Canadian Atlantic and Newfoundland fisheries since 1870. Reference is made to other resource sectors—agriculture, forestry, mining and energy—and students may undertake study of them.

- 3333A/B* Theories of Economic Development:** lecture 2 hours, Z.A. Konczacki. Prerequisite: Introductory Economics. A class in macro-economics equivalent to Economics 2201A/B or 2221A/B and Economics 3327 are desirable. A theoretical framework for the understanding of the process of economic development in the more and the less developed countries is provided with a view to its eventual application to the solution of practical problems. The concluding seminars are devoted to the problem of the foundations of the theory of economic development, and the distinction between the concepts of unilinear and multilinear evolution is discussed.
- 3334A/B* Economic Development: Recent Debates, Controversies and Conflicts:** lecture 2 hours, Z.A. Konczacki. Prerequisite: Economics 1100, Economics 2201 or 2221 and Economics 3333A/B are desirable. Whereas Economics 3333A deals with the more rigorously defined theories and models and their appraisal, this class focuses on the development policies and related controversies. Important examples of such controversies and conflicts, with far reaching developmental consequences, are provided. Attention is paid to the much debated environmental aspects of growth and development.
- 3336B Regional Development:** seminar 2 hours and tutorials, R.I. McAllister. Prerequisite: Introductory Economics. At least one class in both Political Science and Canadian History are desirable. Most countries have richer and poorer regions. The energy crisis has raised additional complications. Economic development issues, policies, and theories facing more industrialized nations are analyzed with particular focus on Canada (especially the Atlantic region), the European Economic Community, U.S.A., Japan, and Australia.
- 3338A Introductory Econometrics I:** lecture 3 hours, R.L. Mazany. Prerequisites: Mathematics 1000 (or equivalent) and one of Economics 2228, Economics 2222A and 2223B or Mathematics 1060A. The theory of some quantitative methods commonly used by economists is introduced in the context of the classical linear model. Estimation problems caused by violations of the assumptions of the classical model are discussed including heteroskedasticity, autocorrelation and simultaneous equations basis.
- 3339B* Introductory Econometrics II:** lecture 3 hours, R.L. Mazany. Prerequisite: Economics 3338A. Practical problems associated with economic data and with model specification and estimation are discussed. The techniques introduced in Introductory Econometrics I are used to estimate simple economic models. Some additional methods of estimation and forecasting are introduced.
- 3350A/B* Social Cost Benefit Analysis:** seminar 3 hours, T.A. Pinfold. Prerequisite: Introductory Economics. Intermediate Microeconomics and Introductory Statistics are desirable. The methodological base of social cost benefit analysis is developed, demonstrating some practical applications. Social cost benefit analysis and capital budgeting are two approaches to investment decision making. The former is used by public sector agencies; the latter is employed by private sector firms. Similarities and differences in the two approaches are highlighted. Solving problems which illustrate basic concepts and a paper reporting on an actual application of the methods taught are important requisites.
- 3432* Regional Economics:** seminar 3 hours, F.M. Bradfield. Prerequisite: Economics 2220A/B. A variety of growth theories are examined, followed by a discussion of empirical efforts and their assessment from the various theoretical points of view. Policy discussion and the presentation of seminar papers are involved. A framework for understanding the reasons for the development of regional problems is provided. Focus is on the underdeveloped regions of developed nations.
- 4000 Seminar on Economic Policy: Public Policy in the 80's:** 2 hours. The discussion centres on the problems of formulating and carrying out economic policy in Canada. Recent budget addresses; industrial policy and tax and expenditure policies are reviewed. Other topics include Canada's reliance on resource exports and capital imports; issues raised by multinational corporations and their consequences for political sovereignty. The choice of a balanced economy or export specialization is examined. The approach is interdisciplinary.
- 4400A Linear Models I:** lecture 3 hours, S. Dasgupta. Prerequisites: Intermediate Micro and/or Macroeconomics and a class in linear algebra are desirable. Admission by permission of instructor possible. Exposition of aspects of economic theory from the standpoint of linear economic models. A brief systematic exposition of linear programming, followed by applications such as in: Theory of the Firm, Leontief Inter Industry Model, Transportation problems, International Trade, General Equilibrium Theory, Game Theory.
- 4408R Competition Policy/Antitrust Economics:** lecture 2 hours, C. Marfels. Prerequisite: A course in Industrial Organization (Ec. 3328R) is desirable but students may also be admitted by permission of the instructor. In this course the various ways of public policy towards business are discussed. Basically, there are three approaches to public policy towards business — the competitive approach, the regulatory approach, and the ownership approach. Under the first, the ownership of the means of production is in private hands, and the public interest is assumed to be protected by the free play of competitive forces. Under the second, ownership remains in private hands but in one way or another the state restrains the exercise of private economic power. And under the third, the state not only owns but manages and operates the productive facilities. Specific attention will be paid to the means of implementing the competitive approach—the antitrust laws.
- 4409B* Linear Models II:** lecture 3 hours, S. Dasgupta. Prerequisites: Economics 4400A and a class in calculus are desirable. Admission by permission of instructor possible. Introduction to dynamic models of economic growth and planning over time. Efficient programs of capital accumulation, growth with terminal objectives and balanced growth, optimal savings over time, theories of interest and capital, money, exhaustible resources and population are discussed.
- 4420A Microeconomic Theory:** lecture 3 hours, E. Klein. Prerequisite: Economics 2220 or 2200. Math 1000 and 1010 are desirable. A basic but rigorous introduction to modern microeconomic theory. Deals in detail with the theory of choice as applied to consumers and firms, and discusses the working of an economy as a system of interdependent decision-makers. Emphasis is on the comparison of alternative solution concepts for competitive economies ending with an introduction to stability theory.
- 4421A Macroeconomic Theory:** lecture 3 hours, J. Cornwall. Prerequisite: Economics 2221A/B and Mathematics 1100 (or equivalent). For those who wish to do relatively advanced work in economic theory, possibly with the thought of going on to do graduate work in economics. The class assumes some knowledge of calculus. Topics covered include: classical models of income and employment; Keynesian models of income and employment; the theory of economic growth (including two-sector models); and trade cycle models.
- 4422B* Inflation, Stagflation and Macroeconomic Policy:** lecture 3 hours, J. Cornwall. Prerequisite: Economics 2201 or 2221. A consideration of different theories of inflation that have been developed to explain the acceleration of inflation in the past decade. Alternative policy solutions are appraised. Forms of incomes policy are taken up in some detail.
- 4426B* Monetary Policy:** lecture 3 hours, R.L. Comeau. Prerequisite: Economics 2221A/B. It is advantageous for students to have completed Eco-

nomics 3326A as well. Assuming a basic knowledge of monetary institutions and macro-economics, a critical analysis of the objectives and effectiveness of monetary policy is developed. Particular attention is given to the Canadian experience and the effectiveness of Canadian policy.

4431A/B* International Payments: lecture 3 hours, A.M. Sinclair. Prerequisite: Economics 2201A/B or 2221A/B. Selected topics in recent international monetary history are examined, the causes of and remedies for external imbalance in national economies are considered, and the reorganization of the international monetary system is discussed. Depending upon class interest, certain issues of international development finance and problems of instability and growth in the international economy may be discussed in detail.

4433B* Intergovernmental Fiscal Relations: seminar 2 hours, J.F. Graham. Prerequisite: Principles of Economics. Economics 2200A/B or 2220A/B, and 3324 are recommended. The principles of intergovernmental fiscal adjustment and their application in a federal political system, particularly Canada, at both federal-provincial and provincial-municipal levels.

4440 Applied Development Economics: seminar 2 hours and tutorials, R.I. McAllister. Prerequisites: Economics 1100 and a basic class in statistics. Following the outline of Economics 2250, but requiring a substantial background in economics, political science, history, sociology and commerce.

4446B Classical Liberalism, and Democracy: (seminar in Philosophy, Politics, and Economics) 2 hours, D. Braybrooke. For description see Philosophy 4470.

4447B The Theory of Games as an Approach to the Foundations of Ethics and Politics: (seminar in Philosophy, Politics and Economics) 2 hours, spring term, D. Braybrooke. For description see Political Science 4485B.

4448A Social Choice Theory: (seminar in Philosophy, Politics, and Economics) 2 hours, D. Braybrooke. For description see Political Science 4480A.

4449B The Logic of Questions, Policy Analysis, and Issue Processing: (seminar in Philosophy, Politics, and Economics) 2 hours, D. Braybrooke. For description see Philosophy 4490.

Graduate Studies

The Department offers a graduate program leading to the MA and PhD degrees. Details of these programs, including a list of graduate courses, are given in the Calendar of the Faculty of Graduate Studies. Senior undergraduates may be admitted to some graduate classes at the discretion of the instructors concerned.

Education

Chairman of Department
S.W. Semple, Acting Chair

Professors

E.Z. Friedenber, BA (Centenary), MA (Stanford), PhD (Chic.)

L.E. Haley, BSA, MSA (Tor.), PhD (California)
W.F. Hare, BA (London), MA (Leics), PhD (Tor.)
J.D. Myers, BA, MA (Tor.), PhD (Edinburgh)

Associate Professors

A. Barton, BA, MA (Trinity)
R. Gamberg, BA (Brandeis), MA (Illinois)
P. Keane, BA (Manch.), MEd (Bristol), PhD (Bath)
T. Laidlaw, BA, MEd (Calgary), PhD (Alta.)
J. Manos, BA, BEd (St FX), MEd (Calgary), PhD (Alta.)
E.T. Marriott, BA (MtA), MEd (Tor.) — Dean, Student Services
H.J. Murphy, BSc (St. Dunstan's), BEd (P.E.I.), MEd (Virginia), EdD (Virginia)
H.E. Poole, BA, MA PGCE (Birm.), PhD (Tor.)
E. Ricker, BA, MEd (UBC), PhD (Tor.), Coordinator, MA and PhD Programs
J.B. Roald, BEd (UBC), MEd (Wash.), EdD (UBC)
S.W. Semple, BA, Dip.Ed. (Syd.), MEd, EdD (Tor.)
S.S. Sodhi, BA, BT, MA (Punjab), Dip. Guid. (Delhi), BEd, PhD (Alta.)
K. Sullivan BSc (Dal), BEd (Dal), MEd (Alta.), PhD (Alta.)

Assistant Professors

R.N. Berard, BA (Antioch), MA (McM), BEd (Dal), PhD (McM), Coordinator, BEd Program
M. Schoeneberger, BA (St. Catherine), MA (Minnesota), PhD (Alta.)
M.R. Welton, BA, MA, PhD (UBC)
B.A. Wood, BA (Tor.), MEd (Ottawa), PhD (Ottawa)

Lecturers

M. Crowley, BA (Miami), MAT (Johns Hopkins)
A. Manicom, BEd (McGill), MEd (Atl. Inst. Educ) Acting Coordinator, MEd Program
M.St.J. Macdonald, BSc (McGill), MA (St FX), EdD (Tor.)

Instructors

J. Altheim
W. Kwak
M. Hutchings

The problems of education have been the subject of serious study since at least the time of Plato and Aristotle. Education is an important and interesting field of study in which historical, psychological, philosophical and sociological inquiries, among others, can be pursued. Many elect to take classes in Education because they are interested in the questions raised for their own sake. Others are interested in education as a program of professional preparation. Such students include in the programs classes in methodology and field experience. The study of education should alert the student teacher to the assumptions which lie behind the methods of teaching being considered, and should ensure that these assumptions do not go unchallenged.

Programs

1. A sequential secondary BEd course of one year which may be taken by students who have already completed a BA, BSc or BComm degree course or otherwise fulfill the requirements for admission to the BEd program.
2. Part-time study toward a BEd at the secondary level.
3. Classes which may be used for credit toward a BA or BSc These classes may be chosen from the following areas: Sociology of Education, History of Education, Philosophy of Education, and Educational Psychology. Students intending to take education classes for credit toward a BA or BSc degree should consult Arts and Science regulation 11.2, page 24. Some classes are cross-listed with other departments, e.g. French, German, Philosophy, so that a student who is not enrolled in a BEd program may register for such a class through the cognate department.

4. A four-year integrated course at the elementary or secondary level at the end of which students are awarded simultaneously the degrees of BA or BSc and BEd.
5. Dalhousie — Nova Scotia Teachers' College Associateship BEd.
6. Dalhousie BA/BSc — Nova Scotia Teachers' College Associateship BEd.

BEd Secondary Programs

Entry Requirements

1. BA or BSc by September in the year of application. Candidates with other bachelor degrees should enquire from the Secretary, BEd Program.
2. Applications from all students are welcomed. Opportunity to draw attention to strengths is provided by the letter of application.

Application

Upon request, a student receives a Dalhousie University Application form, two reference forms, and further details from the Admissions Office, Dalhousie University, Halifax, Nova Scotia. Applications should be made by May 30. Since enrolment is limited there is no guarantee of admission after May 30, although applications will be considered until August 15.

An interview is arranged with the Department of Education after initial application has been made. The date of interview must be confirmed by the applicant.

Selection is based on:

1. Academic record. All applicants, including Dalhousie graduates, must ensure that their transcripts are forwarded to the Admissions Office. (a) Candidates for the BEd secondary program normally should have a "B" average in their major subject, comprising at least five full credit classes (four beyond the 100 level). This major should be in a teachable subject: English, mathematics, geography, science, foreign languages (either in French, German or Spanish), or social studies (history, economics, political science, sociology, anthropology). (b) Individual methods/field experience professors may have more specific requirements for entry into their respective areas. Candidates should consult the Calendar (under Field Experience), the Program Planning Guide or the professor. The program must be planned and approved in consultation with the faculty advisor.
2. References; and
3. Responses on application form.

Those completing this process, and satisfactorily meeting the criteria established by the Department of Education of each of these stages, must attend a personal interview. Other arrangements are made for applicants from outside the Maritime Provinces. Only after the interview or its substitution is a decision made as to whether a student will be offered a place in the BEd program.

Classes in the BEd program are grouped into three general categories:

Educational Foundations: Classes to develop theoretical perspective as a basis for professional performance. There are four main subdivisions in this category — sociology of education, history of education, philosophy of education, and educational psychology. These classes are found in the calendar under course numbers 4000 to 4399.

Methods and Field Experience: Classes which deal essentially in an applied manner with teaching and learning and the evaluation of learning. These classes are found in the calendar under course numbers 4500 to 4999.

Electives: These classes provide supporting experience for other classes in Education, additional academic preparation, or an introduction to areas of potential student interest. Electives may be chosen from any course offered in the BEd program or classes in other departments of the Faculty of Arts and Science.

Secondary Program Requirements

Candidates for the degree of BEd (Secondary) must complete successfully the following: a minimum of 4 *half-credit courses* covering all four Education Foundation areas — sociology, history, philosophy and educational psychology; 1 *full credit* in a methods course in their major subject area; 1 *full credit* in Education 4900 (Field Experience); 1 *credit* in Special Education, as required by the Provincial Department of Education; and 2 *further credits* from any area of the program.

Students planning a BEd following a BA or BSc should be aware that at present certain areas of concentration in the first degree might not easily lead to teacher certification. They are advised to consult with the Coordinator of the BEd Program when drawing up their programs for the first degree.

Part-time study toward a BEd

Students registered part-time at Dalhousie University are permitted to take classes in Education leading to a BEd degree, secondary. Individual timetables may be planned in consultation with the Department of Education, Dalhousie.

Education Foundation Classes

Acceptable for credit towards a BA or BSc degree. Classes are numbered from 4000 to 4399. See Arts and Science regulation 11.2(b), page 24.

BEd Elementary and Secondary Integrated (Four-year) Course

In the integrated course, the classes in education are integrated with academic classes in the second, third, and fourth years, the first year being confined to the regular classes required for the BA or BSc degree or Kings' Foundation Year. Students may also enter the integrated program after their second year.

The ten classes in Arts and Science taken in the second and subsequent years must meet the requirements set forth in Degree Programs, section 11.1(b), page 24.

Education course requirements for elementary and secondary integrated students are the same as those required by sequential students. The year of study in which the various education classes are to be taken is up to the individual. An exception to this is the methods and field experience. The integrated student, both elementary and secondary, should plan third and/or fourth year classes in consultation with the Department of Education so that methods classes and field experience may be accommodated. It is advised that all integrated students meet with their Faculty Advisor early in their second year to plan a suitable program. Twelve weeks of field experience may be required.

Students admitted into the integrated program must maintain a minimum of a B average in work completed for both degrees.

Enquiries should be made to the Secretary, BEd Program, Dalhousie University by May 30 of the student's first or second year at Dalhousie University.

Students wishing to obtain a BEd and a BA or BSc with honours should consult the Department of Education and the department or departments in which they wish to do their honours work not later than the beginning of their second year in order that a proper sequence of classes may be arranged. Five years from senior matriculation are normally sufficient to complete this course of study.

BEd Degree in Association with Nova Scotia Teachers' College

General Description: The program is available at Dalhousie University to graduates of the Nova Scotia Teachers' College who have completed the three-year Associateship at NSTC. Suitably qualified students may graduate after taking five further classes at Dalhousie. The program is a fifteen-credit course, comprising six credits in education and nine credits in Arts and

EDUCATION

Science. A maximum of ten credits may be transferred from NSTC to the joint Dalhousie/NSTC BEd degree, but they must meet Dalhousie's transfer credit regulations. It is available for full-time and part-time students.

Prerequisites: The applicant must have graduated from the three-year Associateship program at the Nova Scotia Teachers' College.

Program: 15 required credits — 6 in Education: (a) 5 maximum may be taken at NSTC and must meet Dalhousie transfer credit regulations; (b) 1 education class must be taken at Dalhousie; plus 9 in Arts and Science: (a) 5 maximum may be taken at NSTC and must meet Dalhousie transfer regulations and *not* be in education; (b) 3 must be taken at Dalhousie in Arts and Science subjects other than education and at least 2 must be above the first year level; (c) 1 class, taken at Dalhousie, must be in consultation with the student's advisor (in the Department of Education).

Dalhousie BA/BSc and BEd Degrees in Association with Nova Scotia Teachers' College

General Description: The program is available at Dalhousie University to graduates of the Nova Scotia Teachers' College who have completed the three-year Associateship at NSTC. Suitably qualified candidates may transfer up to eleven credits from NSTC to Dalhousie. The program is a twenty-two credit course, comprising seven credits in education and fifteen credits in Arts and Science. All credits transferred from NSTC must meet Dalhousie's transfer credit regulations. Students may complete the program on a part-time or full-time basis thereafter.

Prerequisites: The applicant must have graduated from the three-year Associateship program at the Nova Scotia Teachers' College.

Program: 1. Twenty-two credits are required, seven in education and fifteen in Arts and Science. 2. 7 in education: (a) 5 maximum from NSTC; (b) 2 further from Dalhousie; plus 15 in Arts and Science: (a) 6 maximum from NSTC; (b) 9 further from Dalhousie. 3. A subject major must be chosen at registration and must be approved by the Department concerned. 4. Students must maintain a minimum of a B- average in work completed for both degrees.

Transfer of Credit

Decisions concerning transfer of credit will be made following consideration of transcripts and students' interested areas of study. Normally, 3 ½ credits from another university or non-degree status will be considered for transfer credit. Enquiries should be directed to the Secretary, BEd Program.

Students who wish to obtain the degree of BEd with transfer of previous credit must obtain the degree of BA or BSc and apply for admission to the BEd program. Graduates of non-degree granting Teachers' Colleges who have a BA or BSc should note that the following guidelines are used in transfer of Education credits: Graduates of an acceptable three-year program take an additional two and one-half classes. Graduates of an acceptable two-year program must take an additional three and one-half classes. Graduates of an acceptable one-year program are required to take an additional five classes. The actual selection of classes is made to suit the needs of each student and you are advised accordingly when your file is examined.

Certification of Teachers

Licenses to teach are issued by the Department of Education, Province of Nova Scotia. According to the regulations of the Province of Nova Scotia, every applicant for a Teacher's license or Professional Certificate must submit with his application documentary evidence (in a form prescribed by the Minister of Education) respecting the applicant's moral character, age, health, training and qualifications. Further information may be obtained from the Registrar, Nova Scotia Department of Education. Graduates with senior

matriculation are entitled to a Teacher's Certificate, Class 5 in Nova Scotia. All other BEd Graduates should consult the Registrar, Nova Scotia Department of Education, concerning class of Teacher's Certificate. Students from other provinces should consult the appropriate provincial department of education for certification and licensing information.

Certificate Program in Educational Administration

This non-degree program may be completed through part-time or full-time study. It is intended for those persons interested in studying in the field of educational administration at an introductory level.

Admission requirement: is graduation from a teacher's college/normal school or an acceptable undergraduate degree plus a BEd (or its equivalent). Advanced standing for classes completed in the former Nova Scotia Block Program will be considered upon application to the program. The deadline for applying is August 15th for the academic year.

Program Length: is 5-8 credits depending upon qualifications. The minimum program will usually be prescribed for those holding an undergraduate degree and a BEd (or its equivalent); all others will take upwards of 8 credits depending upon an assessment of qualifications. Full-time students may take a minimum of 6 credits and part-time students a maximum of 2 ½ credits during a regular session. A maximum of 1 credit may be taken during a summer session (½ credit in each half of the summer session).

Program Requirements: are as the following core and elective classes

Core Classes: (compulsory for all students).

- All of the following classes:
 - School-Community Relations (Ed. 8432), E. Ricker; ½ credit
 - Supervision of Personnel and Programs (Ed. 8411 and Ed. 8412), E. Marriott; one-half credit
 - Budget and Finance (Ed. 8471), J. Levangie; one-half credit
 - Field Study of Administration (Ed. 8490), Ed. Admin. Faculty; one credit
 - Implementation and Administration of Curriculum (Ed. 8520), M. Schoeneberger; one credit
 - One of the following ½ credit classes:
 - Administrative Roles and Structures (Ed. 8401), E. Ricker
 - Concepts in Educational Administration (Ed. 8402), K. Sullivan
 - Philosophy of Educational Administration (Ed. 8451), W. Hare
 - Educational Ideas and Issues and the Administrator (Ed. 8440), K. Sullivan
 - Education and Public Policy (Ed. 8431), E. Ricker
 - One of the following classes:
 - Teachers, Their Organizations and Decision-Making in Education (Ed. 8030), R. Berard
 - History of Curricular Thinking (Ed. 8060), B. Roald
 - Ethics and Education (Ed. 8151A), W. Hare
 - Open-Mindedness and Education (Ed. 8162B), W. Hare
 - Youth as a Social Category (Ed. 8201A), E.Z. Friedenberg
 - The School as a Communications System (Ed. 8202B), E.Z. Friedenberg
 - Schools and Social Identity (Ed. 8222B), E.Z. Friedenberg
 - Multiculturalism and Education (Ed. 8290), T. BA
 - Special Education Policy Decisions (Ed. 8341A), S.S. Sodhi
 - Developmental Psychology (Ed. 8370), J. Manos
- Minimum 5 credits.*

Elective Classes (chosen in consultation with a faculty advisor): Students who are required to do more than the basic 5 credit program or students who wish to take more than the minimally prescribed program may select up to 3 credits in additional classes from the following:

- Computers in Educational Administration (Ed. 8433)

Administrative Roles and Structures (Ed. 8401) or Philosophy of Educational Ideas and Issues and the Administrator (Ed. 8441) (i.e., whichever of these classes is **not** taken as part of the core program)

Undergraduate classes (Department of Education or other departments of the University)

Total: 3 credits.

Classes Offered

The following list represents this year's classes. Minor changes will be noted in the preregistration material sent to the students who are accepted into the program.

Certain Education classes are offered in Summer School. Details may be obtained from the Director of Summer School and Extension.

4012 A/B Sociology of Education: two lecture hours per week. Mainly theoretical, the accent is on the rationale and assumptions of educational systems, socialization in Canadian Society, and the positing of alternatives to traditional educational practices.

***4011A/B Family, State and Schooling:** This class begins with questioning the nature of our knowledge about schools to develop a way of thinking analytically about schools and schooling. Through readings and discussion, an attempt is made to display sets of relations (both current and historical) that exist among the school, the family, the labour force and various state institutions, particularly as these relations produce and maintain inequalities of class, race, and gender.

4020 or 4021A/B Gender Roles: Identification and analysis of problems deriving from sex roles form the core of this class. Emphasis is on female roles in contemporary Canadian society. The significance of factors which relate to an understanding of the subject is also considered. Attention is given to possible approaches to solutions of the problems already identified and analysed.

***4030 Education, Ideology, and Revolutionary Change in China**

***4090 The Relationship Between Theory and Practice in Education**

***4101A/B The History of Western Educational Thought:** The history of educational ideas in the West. Through lectures and discussions of readings, the place of education in the ancient, mediaeval, early-modern, and modern worlds is examined. The development of our own educational ideas can then be subject to more sophisticated criticism.

4121A New Education in a Canadian Context: The New Education curricular changes, institutional, experiments and philosophical goals that affected Canadian education at the turn of the century are explored. Foreign influences and forces in Canadian society that affected public schooling are examined. Students investigate primary source material at the Provincial Archives of Nova Scotia to determine the extent to which Nova Scotian curricular changes during this period (1890-1911) were affected by these trends. Arranged in a seminar-lecture form so that students' research can be guided each week, culminating with each student submitting a research paper.

4132B Progressive Education in a Canadian Context: Continuing many of the themes explored in the previous term (Education 4121A), significant institutional shifts of emphasis which occurred in Canadian public schooling after World War I are explored. American and British influences on the curriculum, as well as on the stated intentions of educators, are examined. Primary source material applying to Nova Scotia is investigated to determine if the Progressive Education movement had an effect on the schooling of children between 1911 and 1940. A seminar-lecture form is followed and a term paper is required.

4141A Educational Issues in Canadian History: An overview of major social and political issues in Canadian education. Selected case studies introduce the method of identifying and asking appropriate questions about the nature of issues and conflict. The historical antecedents of a number of major contemporary issues in education are explored in depth. A consideration of the "issue approach" to history in relation to various schools of historical thought about education is provided.

4142B Educational Issues in Canadian History: A continuation of 4141A but with a different selection of topics. A student is free to take the first half, second half, or both.

***4171A/B The Teacher in History:** Emphasis is on the connections between the historical experience of teachers and the contemporary situation in which teachers find themselves. The political characteristics of the education system are critically analysed and the development of the occupation of teaching, in comparison with other occupational groups, is examined. Particular topics related to the changing roles, attitudes and influences of teachers in terms of educational and social policy are discussed. A number of reading and writing assignments must be completed.

4201A/B Analytical Philosophy of Education: An introduction to the analysis of the central concepts in educational theory with particular attention to certain attitudinal concepts which have been neglected in contemporary philosophy of education.

***4221A/B Introduction to the Philosophy of Education**

4251A/B Philosophical Issues in Sex Education: A number of philosophical problems which arise in connection with sex education are considered. Both sex education and socialization are discussed and an attempt made to clarify central concepts.

***4290 The Adolescent**

4311A Psychology and Education of the "Exceptional" Child: A broader understanding of the term "exceptional child" and the causes for such behaviour is provided. Psychodiagnostic and remedial processes to help children with communication behaviour problems are considered. Administrative use of standardized tests is discussed. Myths in Special Education are considered using Psycho-social Model of "exceptional behaviour."

4312B Myths in Special Education: Special education practices which attempt to help the "special child" "adjust" to the school as it presently exists are examined. Diagnostic approaches which lead to "suspicion confirming" and "pigeonholing" of the child are considered along with alternatives to special and remedial education.

4322 Learning in the Classroom: The psychology of learning, involving an examination of certain internal and external conditions which influence the direction and efficiency of the learning process. There is an orientation throughout to classroom learning; the focus of enquiry is fundamental psychological processes.

4335A/B Childhood into Adulthood: Psychological development from early childhood onwards from a cognitive perspective shows how adult identities are constructed by the individual by continual assessment and periodic revision of objectives.

4340 Developmental Psychology: An examination of the areas of human development with particular emphasis on cognition; personality, social, and moral development. Theory and relevant experimental data to cultural contexts are related.

EDUCATION

4351A/B Psychology for Sex Education: This class traces the psychological development of sexual interest and love. Special attention is paid to psychological factors in sex education.

4361A Understanding Reading: Psychological and linguistic factors relevant to the skills of fluent readers and to the process of learning to read are examined. An analysis of the reading process provides an understanding of what the skilled reader can do and how the beginning reader develops the skill. Reading instruction is discussed with the emphasis on "how a child learns."

4371A Social Psychology of Education: The psychological climate of the classroom is examined from a traditional, behavioural, and humanistic viewpoint. Emphasis is on the teacher-student relationship found in these three approaches to education and the resultant psychological effects on both the teachers and students.

4372B Social Psychology of Education: A framework for understanding the social interactions that go on within schools, and the effects these have on the participants used to the variations in teachers' and students' efforts to maintain self-esteem and respond to social roles. Evaluation consists of a project and a final examination.

*4381A/B Introduction to Counselling

*4500 Media: offered as either a half or full credit.

4540A The Nature of Scientific Knowledge: Since scientific knowledge is regarded as the most authoritative kind of knowledge, teachers, as the paid distributors of knowledge on behalf of the state, must understand clearly what the source and nature of scientific knowledge are, whether or not they are nominally science teachers. How scientific research is affected by its political and social context, and how the putative objectivity of scientific method invalidates many otherwise authoritative and informative ways of experiencing the world are examined. Evaluation is on the basis of one or two oral seminar reports on a topic illustrating the nature of scientific knowledge and its development; and a two-hour written examination during the last scheduled class meeting.

4541A/B The Science Curriculum in A Social Context: Tomorrow's school science curriculum is being discovered in laboratories today. What is done, and its philosophical and social significance, are addressed through reading and discussion, to foster a deeper understanding of what it means to be a teacher of science.

4552A/B Shaping Tomorrow's Science Curriculum: Against the background gained in the first half of the class, we examine in this second half the social, educational, and other pressures that determine the nature of prescribed curricula for school science. Problems of curricular change and implementation are studied, and current proposals for new approaches to science curriculum are examined. Particular attention is paid to the current Junior High School Science Curriculum in Nova Scotia, and to the Maritime Junior High School Science Curriculum Project as an example of modern curriculum planning.

4560 Geography in Education: An introduction to the structure of geography and contributions to geographical thought. The class is intensive, closely integrated, with opportunities for practical work. Rural field trips are held on two weekends in the fall and involve absence from Halifax over two nights. Local field trips are also conducted from the campus at various times during the academic year.

4620 Theatre 4220 Developmental Drama: For class description see entry in the Theatre section of this calendar.

4633A/B Computers and the Curriculum: This class concentrates on the role of microcomputers in the school. Emphasis is on curricular implications arising from the presence of computers in the classroom and on evaluating existing computer courseware. Students also receive an introduction to at least one computer language.

4642B Principles of Outdoor Education: A. Richards. For class description see entry in the Recreation, Physical and Health Education section of this calendar.

4684B Physical Activity for Special Populations: For class description see entry for 3384, in the Recreation, Physical and Health Education section of this calendar.

4700A Introduction to the Theory and Practice of Teaching: (required for students in a *three-year Integrated Elementary BEd Program*). The major theory/practice issues and concerns in elementary education are introduced through films, readings, and observations in school. The school observations are done as a group, include discussions with teachers about their work, and serve to introduce a variety of classroom settings and ways of thinking about differences in classrooms, teachers, and schools.

*4701A Psycho-Educational and Policy Decisions in "Special Education."

*4721A Topics in the Teaching of Science.

4743A/B Reading Across the Curriculum: This class clarifies the kinds of questions which serve as a basis for instructional decisions. Students investigate various applications of psycholinguistic theory. Examining instructional techniques that can be used in the classroom for developing students' fluency as readers and writers.

4750 Teaching English in Secondary Schools: Personal approaches to the teaching of English at the secondary school level are developed. Weekly classes involve those activities teachers probably encourage. A range of classroom procedures and teaching methods fosters an imaginative and critical approach to the demands of teaching English.

4760 Teaching Social Studies in Secondary Schools: Skills in curriculum planning and course organization are developed and a variety of teaching strategies are introduced. Reflection on the nature and purpose of each discipline in the social studies allows one to develop appropriate lessons. Evaluation is based on weekly papers and a mid-term exercise in the first term and a major curriculum planning project and a mid-term exercise in the second term.

4770 Teaching Geography in Secondary Schools: Prerequisite: An undergraduate class in Geography or Education 4560. An exploration of the objectives of geographic study; the acquisition of skills and the development of concepts and appreciations. Emphasis is on competencies in classroom teaching, shifting to a concentration on aspects of curriculum planning and development as they relate to geography.

4780 Teaching Mathematics in Secondary Schools: The study of a variety of methods relating to the teaching of mathematics at the secondary level forms the framework for this class. Students must read about each technique, participate in discussions about these techniques, and in many cases be able to observe classroom situations where each method is used. A strong emphasis is placed on exploring the curriculum changes occurring in Education. This includes the place of statistics, the computer, the calculator, problem solving, and geometry in a school curriculum. Evaluation is based on one major project, assignments done individually and in groups, class participation, and a final examination.

4802B Science: A Cross-Disciplinary Approach: Science is usually taught as discrete subjects. This class seeks to integrate some current scientific concepts and technological practice along one particular dimension. It traces the ways in which major bioelements behave both inside and outside living organisms. Much of the emphasis is biochemical, but the treatment ranges over such topics as soils and fertilizers, digestion, and microbial activities. Instead of a lab component, students use their teaching expertise to devise curriculum mini-projects illustrating living/non-living relationships. Of particular interest to Junior High science teachers, the class appeals also to those who teach science at the Elementary and Senior High levels.

4841A/4842B Teaching French in Secondary Schools: Open only to students who have demonstrated adequate competence in French language and culture (passing a French language proficiency exam is required). Students taking this class must consult the instructor. A consideration of foundations of second language teaching which moves to a discussion of methodology, techniques, materials (including visual aids), and testing. Emphasis is on developing teaching strategies which enable students to use French as a tool for authentic self-expression, orally and in writing. Directed observation of experienced teachers and practice in the development of teaching skills are integral parts of the class. Evaluation is based upon class participation (micro-teaching, oral reports, contributions to discussions), written projects, lesson plans, and examinations.

4871A Further Educational Studies

4872B Further Educational Studies

4873C Further Educational Studies: Students may apply to instructors for permission to undertake either a specially designed readings course in a given area, or to undertake additional work in their first teaching method, for credit. *This may also be done with prior consent in writing from the instructor to the Coordinator, BEd program. The instructor thus assumes personal responsibility for supervising the work of a student enrolled in this half credit elective course.*

4881C Science as a Human Activity

4882C Teaching Science in Secondary Schools: (4881C and 4882C are required of BEd candidates in Science). Science is more than a collection of facts. It is a way in which human beings seek to understand, predict, and control the world around them. This class inquires into the nature of science — the different meanings that attach to the word "science" for different people, the significance of the terms (*like fact, hypothesis, theory, explanation, law*) which people use in connection with science, and the ways of reasoning about the world that scientists use. But science is more, too, than "natural philosophy." It is an institutionalized activity, a profession into which people enter only after a long period of initiation. It is a source of employment, a requisite for technological innovation, and a receptacle into which public and private money may pour or trickle. These aspects, too, will be examined.

4891A Additional Curriculum Projects

4892B Additional Curriculum Projects

4893C Additional Curriculum Projects: Students may apply to instructors for permission to undertake additional project work in the area of curriculum design, implementation, and evaluation, for credit. *This may be done with prior consent in writing from the instructor(s) to the Coordinator, BEd Program. The instructor(s) thus assumes personal responsibility for supervising the work of a student enrolled in this half credit elective course.*

4900 Field Experience: It is the primary objective of the field experiences to provide students with opportunities to analyze, compare, and participate in a variety of teacher-learning situations. Students who intend to apply for a Provincial Teachers' Certificate should plan to log the equivalent of 100 hours field experience. All arrangements for field experiences are made through the Field Development Office and Methods Class Instructor.

4901 Elementary Curriculum Study and Field Experience: (This class is restricted to Integrated Elementary BEd students.) Conducted partially in the Dalhousie Elementary School, and partially in monthly tutorial sessions. The skills of planning integrated curriculum units, linking provincial guidelines to teacher-planned curriculum and the teaching skills involved with small group work, types of questioning, and the evaluation of children from a developmental perspective, are topics covered.

4910S Additional Field Experience: (*Available only during the first Summer Session.*) Permission of dept. required. This one-half credit class is made available to the BEd students as an elective which they may choose to supplement the basic requirement for field experience. These additional field experiences are acquired through a block of three weeks spent in the schools at the end of the academic year. *This class can only be taken with the permission of your major methods instructor and the BEd committee.*

4912B Theme Study: Additional Field Experience in Dalhousie Elementary School: Prerequisites: 4900R & 4742B or equivalent. This half-credit class offers two opportunities to the student: 1) six weeks of increased field experience, bringing the total logged teaching time to eleven weeks which is closer to the twelve weeks required in many provinces in Canada; 2) guided supervision in the implementation of a theme developed with the faculty supervisor in advance and designed for the spring theme study at the Dalhousie Elementary School. The student also gains experience in team teaching as the theme may be team-taught by two students to one of the three groups in the School. Because this class overlaps with graduation in May, a letter from the BEd Coordinator is written at the conclusion of the class in May indicating that all classes have been completed to fulfill the requirements for the BEd elementary program and that licensing forms have been sent to the Department of Education so that the student's application for teaching positions will not be jeopardized. A teaching license would be issued by the Department of Education at the end of June. The student would graduate in October. The class mark is arrived at by the supervising professor in consultation with the cooperating teachers and after consideration of the student's teaching performance and written conclusions regarding the theme's implementation.

4932A/B Measurement and Evaluation: A study of the writing objectives, teacher-made tests, standardized tests, random variation, and basic statistical ideas.

*4961A Canadian Studies: Methods of Teaching

4962B Canadian Studies in the Curriculum

Educational Administration Classes

Note: 8000-level classes are open only to students registered in the Certificate of Educational Administration Program.

8030 Teachers, Their Organizations, and Decision Making in Education: This class examines the situation in which teachers find themselves in an historical, and current political/social context. The development of other occupations and "Professions"; the relations and conflicts between teachers and their organizations, government departments, educational administrators, parents and students; and the extent to which teachers

EDUCATION

have achieved or failed to achieve a significant influence on educational policy, are the major themes of this class. Students are expected to complete a number of specific reading and writing assignments. They are also expected to undertake a major research project in consultation with the instructor.

8060 The History of Curricular Thinking: This class examines the evolution of ideas about curriculum in the Western educational tradition, the social, ideological and cultural forces that have affected curricular thinking and the impact of various curricular traditions and perspectives on contemporary education.

8151A/B Ethics and Education: A graduate seminar in philosophy of education dealing with analytical and normative aspects of ethical issues in the field of education. Topics include: equality, reverse discrimination, competition, assessment, rights and responsibilities, happiness, privacy, moral education, moral issues in research and publishing, and the ethics of curriculum decision-making. Readings are based on books and articles by contemporary philosophers of education.

8162A/B Open-Mindedness and Education: A graduate seminar in analytical philosophy of education. The central purpose of the class is to examine the concept of open-mindedness and to explore the relationship to other concepts such as neutrality, commitment and doubt. The claim that open-mindedness is a necessary feature of the educated outlook is considered. Further educational issues are explored such as the relationship of the trait to particular methods of teaching, and the possibility of open-mindedness in teaching particular subject areas. Attention is also given to the sceptical position that open-mindedness is impossible. Readings are taken mainly from contemporary philosophers, though reference is frequently made to positions taken by historical philosophers. Some previous background in contemporary philosophical analysis will be useful. The class meets two hours each week. Short written assignments are given during the term, and a major term paper is required.

8202B The School as a Communications System: A study of the role of the school in establishing cultural hegemony: that is, in communicating to students the unstated assumptions about how the world works and their present and prospective place in it that come to govern their conduct and their expectations. Emphasis is on recently published empirical accounts of observations in classrooms and administrative offices. Students will be asked to make individual, seminar-style presentations to the class based on specified readings. No other term paper; one final take-home examination.

8221B Schools and Social Identity: The evolution of the public school as the instrument for forging national and class identity. The role of schools, colleges and universities in establishing levels of expectation among the individuals of varied class and ethnic backgrounds, language and social identity. Students are asked to make individual, seminar-style presentations based on specified course readings; no other term paper required. One final take-home examination may be required.

8290 Multiculturalism and Education: This class is intended to introduce the student to theories and activities that promote a multicultural consciousness in Canadian education. Several conceptual frameworks which deal with the theme of multiculturalism are presented and criticized. Some multicultural programs and activities are considered. Data concerning ethnic groups in Canada are presented, with particular emphasis on minorities in Nova Scotia. The conceptual base for the class is drawn from cultural anthropology. However, the class has a strong educational focus. For assignments, students are asked to gather materials from primary sources, and design and prepare projects that can be used in classrooms in the province. The class also includes guest lectures by persons presently concerned with multiculturalism in Nova Scotia.

8341 Special Education Policy Decisions: This class deals with contemporary issues on the assessment and "management" of the "exceptional" child. Methods of psycho-educational diagnosis and remedial treatment are discussed. Various myths of Special Education and policy decisions based on them are also considered. *Admission only by permission of the instructor.*

8370 Developmental Psychology: An examination of child development studies including major theoretical positions and relevant experimental data. Emphasis is placed on incorporating material into a cultural and educational context.

8401A Administration of Public Education in Canada: This class provides an overview of educational administration in Canada within a lecture/discussion format. It takes account of significant factors that have influenced the design and operation of administrative structures. It also explores certain problems that have not been resolved satisfactorily within these structures and which in some cases have been further exacerbated by them. Emphasis is placed upon an examination of the provincial school systems. Lecture topics include: historical and contemporary assessment of policy goals in education; the BNA Act, the original allocation of roles and responsibilities in education and the effects of constitutional practice; the new constitution and education; the evolution of federal-provincial relations in education; the role of provincial educational bureaucracies; the role of local authorities; the role of pressure groups such as teachers' associations and school board associations; the quest for structural reforms to achieve the goals of education. Discussion topics based on current issues and reform measures are designed to show the often controversial nature of traditional structural arrangements. Topics include: national goals for education; regional disparities and education; minority linguistic and religious rights in education; community control of schools; financial reform; curriculum reform; teachers' strikes; parents' rights; students' rights. There is no prerequisite. This class is a prerequisite for 5431B/8431B and 5432B/8432B.

8402B Concepts in Educational Administration: This is an introductory class that provides an overview of the major concepts that have dominated the field of educational administration over the years. Topics include: professionalism; motivation; organizational climate and effectiveness; communications; decision-making.

8411A Administration of Educational Personnel: A central theme of this class is educational leadership: leadership in classrooms, departments, schools and school systems. As such it involves a rigorous examination of the supervision of instruction and evaluation of teachers within the organizational setting of the school. The administrator's role in professional development and in-service education is also analyzed. The class rests on the assumption that there are certain supervisory skills administrators would do well to acquire if they wish to lead educational organizations in professionally productive directions.

8412B Administration of Educational Programs: Specific administrative functions involved in organizing the school system for instruction, the acquisition and allocation of required resources, and planning the continuing development of the educational program are dealt with in this class.

8431B Education and Public Policy: Prerequisite: Ed. 540401 or its equivalent or the permission of the instructor. How educational policies are formulated and how they might be better formulated are the two interrelated themes explored in this class. Consideration is given initially to the broad goals of Canadian education that policy-makers have attempted to define and accomplish. Various normative and empirical perspectives on the policy-making process are then reviewed; topics include interest group theory, incrementalism, environmentalism, systems analysis, rationalism, and various elite theories of control. Distinctions among various kinds of policies

in empirical assessments of the policy-making process are also considered, as is the myth that education is "non-political." The last half of the class deals with commonly used techniques for formulating policy (royal commissions, task forces, white papers, etc.) and the assessment of one or more major policy initiatives in Nova Scotia (e.g., the Walker Report) for which these techniques have been employed. Guest lecturers having special knowledge of the issues under review are usually invited to participate.

8432B The Local Government and Administration of Education: The proposition that schools and other educational institutions should be locally governed is a central component of democratic thought in North America. This class will begin with an examination of the origins of the ideology and practise of local control in the 19th century and then move on to consider how a tradition of localism was nurtured. Consideration is next given to the transformation that took place from local to centralized bureaucratic control and its concomitant effects on local government: for example, the enlargement of school districts, the growth of local administrative power, and the recruitment by district school boards of a homogeneous middle-class membership. The final part of the class deals with attempts made in recent years to alter the *status quo*. These range from the radical critiques of the sixties to the reformist recommendations of the Graham Commission in Nova Scotia and the recent White Paper proposals in Quebec. The implications for the local control found in the Walker Report's recommendations are also considered. Throughout the class students are asked to assess the contemporary reality of local control by monitoring the activities of one district school board in the Halifax area. Regular observation of board meetings and the preparation of a research paper based on a theme or issue related to the board's activities are normally required. Prerequisite: Ed. 540i401 or its equivalent or the permission of the instructor.

8440A Contemporary Issues in Educational Administration: National and International Issues: The purpose of this class is to examine issues which have affected educational administrators on a national and international level within the recent past and will continue to do so for the foreseeable future. Some of the topics to be covered are listed below. Students are expected to explore at least one area in-depth. This should not be a student's first graduate course in administration; 5402B is suggested as a suitable prerequisite. The list of topics varies according to the issues of the time, but normally includes the following: (a) Research and Theory Development; (b) Community Education; (c) Minority Education; (d) Professional Development; (e) Leadership; and (f) Planning.

8451A Philosophy and Educational Administration: This class is offered to provide those who are, or are about to be, employed in administrative capacities in schools and other educational institutions with the opportunity to reflect in some detail on those concepts which are central to the practise of educational administration. These concepts are of two kinds: first those, such as leadership, competence, authority, respect, and responsibility, which refer to various traits regularly cited as norms which the administrator should exemplify; second, all those complex concepts which are utilised when attempts are made to explain or justify such norms, for example, decision making, judgement, consultation and, of course, administration itself. With respect to the latter group, the main task is to make clear the meaning of each concept. For example, is it the case (as Christopher Hodgkinson and many others maintain) that administration is the name of a generalized form of activity? These analyses will, of course, play a fundamental role in our examination of the first group of concepts listed above, i.e., those referring to administrative norms. These concepts too will require analysis, and in particular, an examination of the way each is logically related to the others. But in addition to this analytical inquiry, the class will also pursue normative issues. What sorts of reasons, if any, can be given in support of the administrative norms cited? Is the argument affected, and if so how, by the fact that the organization in question is an educational institution? This class will have a practical focus inasmuch as the examples chosen to illustrate particular issues will be drawn from concrete administrative problems and contexts.

8460R Law and the Schools: The objective of this class is to familiarize students with the legal framework within which schools operate. It is not designed to examine law generally but rather to focus on the impact of law on the educational structure. Some consideration of the legal process — legislative, administrative, and judicial — forms part of the class instruction. Topics include: (a) Access to Legal Information; (b) The Distribution of Powers under the *Education Act*; (c) Teachers and Collective Bargaining/Employment; (d) Administrative Law and the Schools; (e) The Legal Rights and Duties of Administrators, School Boards, Teachers, Students and Parents; and (f) Liability for Negligence. This class provides an understanding of how laws affect schools and their inhabitants.

8462B Interest Groups in Education: Interest (or pressure) groups are widely considered as important sources of influence on educational policies. Whether such influence may be fairly attributed to these groups is a question explored in this class; so too is the closely related question of how desirable interest group influence actually is. Topics include: the development role of interest groups in Canadian society; the role of interest groups in education; the internal organization and politics of interest groups in education; bureaucratic control within interest groups and leadership-membership conflicts; career patterns of interest group leaders; lobbying and public opinion campaign techniques; theoretical perspectives on interest group behaviour; and finally, normative assessments of interest group behaviour — do they contribute to or detract from a healthy democracy? Do they help fashion better policy? Assigned work and some seminars are based on the current activities of one more interest groups in the Nova Scotia educational system, such as the Nova Scotia Teachers' Union, the Nova Scotia School Boards' Association, etc. Officials of these groups are frequent participants in class seminars. The class has a lecture/seminar format.

8471A Educational Finance: This class provides an overview of changes in educational finance in Nova Scotia since 1954 and focuses on developments during the last two years that have resulted from the implementation of recommendations in the Walker Report. An indepth analysis is undertaken of the Walker Report, the implementation phase of the new financial system, the Formula Review Committee process, and government reactions to recommended formula changes. The final phase of the class considers the Nova Scotia grant system in relation to financial arrangements in other provinces.

8490 Field Study of Administration: *Purpose:* To provide an opportunity for the Certificate students in Educational Administration to discuss administrative issues/concepts with a senior administrator in a context of the latter's educational setting so that the student must: (a) review the major issues taken in each class from his Certificate Program and discuss these issues with the course instructor, (b) with the assistance of the instructor, prepare an agenda for discussing some of these major issues with the practitioner related to daily activities in the school system, (c) prepare a log from each meeting with the practitioner, and (d) write a paper explaining the match/inconsistencies between issues/concepts in Educational Administration and practice as carried out by a practitioner.

8520R Implementation of Curriculum: The class examines the field of curriculum implementation from both a theoretical and a practical perspective. A variety of implementation models are analyzed. Related topics to be examined include issues such as: the role of change agents (principals, supervisors, outside consultants, teachers, etc.), managing curriculum implementation, barriers to change, and the ethics and politics of implementation. Several current curriculum implementation projects are examined. Class participants are expected to engage in developing/ assessing, under supervision, an implementation project.

Engineering

Chairperson of Department
D.M. Lewis

Professor
J.C. MacKinnon, BEng (NSTC), MScEng (Lond.), PhD (Dal), PEng

Associate Professors
D.M. Lewis, BEng, MEng (NSTC), PEng
S.T. Nugent, BSc (Mem.), BEng (NSTC), MSc (Tor.), PhD (UNB), PEng
(Jointly with Physics)
E.N. Patterson, BSc (MtA), BEng (NSTC), MSc (Queen's), PEng
D.G. Retallack, BSc (Dal), BEng (NSTC), MSc, PhD (Manchester), PEng

Assistant Professors
J.D. Cousens, BEng, PhD (NSTC)
M.H. Mansour, BEng (Cairo), BSc (AIN Shams) MEng (McMaster), PEng,
PhD (TUNS)

Visiting Lecturers (Previous Year)
P.L. Allen
O.K. Gashus
R.C. Gilkie
E.A. Gunn
C.R. Hazell
W.G. Speirs
W.W. Spencer
P.A. Tanguy

Professional engineers are concerned with making the properties of matter and the sources of energy in nature beneficial to mankind. The curriculum develops "an individual's ability to use the basic sciences, mathematics, engineering sciences, economics and social sciences to convert, use and/or manage resources optimally through effective analysis, interpretation, and decision making to meet objectives." University studies in engineering are concerned with the design of engineering systems, but the skills learned are widely applicable. Many engineers combine their profession with other activities, most notably management.

The professional degree in Engineering is the Bachelor of Engineering Degree which is conferred by the Technical University of Nova Scotia in association with Dalhousie University. The first two years of study are taken at Dalhousie and comprise a program of 11 credits which lead to the Diploma in Engineering. Upon successful completion of this program, students will be admitted to the Technical University of Nova Scotia for a further three years of study leading to the degree of Bachelor of Engineering in Civil, Electrical, Mechanical, Mining, Chemical, Industrial, or Agricultural Engineering. These programs have been accredited by the Canadian Accreditation Board of the Canadian Council of Professional Engineers.

TUNS offers a combined BEng/MEng program in Metallurgical Engineering. The admission requirement is the Diploma of Engineering, but admission is limited to ten students per year, on a competitive basis. The program is accredited by the Canadian Accreditation Board of the Canadian Council of Professional Engineers.

Engineering Physics, which was for many years offered by Dalhousie, has been transferred to TUNS. The first two years of study are the Diploma in Engineering. The final three years are taken at TUNS. Admission will be restricted. TUNS intends to seek accreditation, by the Canadian Accreditation Board of the Canadian Council of Professional Engineers, for this program.

Dalhousie offers various programs for students wishing to pursue studies jointly in Engineering and in Science. Students may arrange programs lead-

ing to a Bachelor of Science Degree, with a major in Biology, Chemistry, Computing Science, Geology, Mathematics or Physics in addition to the Diploma in Engineering. These combined programs require three years of study at Dalhousie. Three years are still required at TUNS in order to receive the Bachelor of Engineering degree.

Students wishing to enroll jointly in the Diploma in Engineering and a Bachelor of Science must consult the Chairman of the Department of Engineering prior to registration in the first year.

Students who graduate from TUNS fulfill the academic requirements for registration as a Professional Engineer in all provinces in Canada. In addition to the academic requirements, the Profession requires that applicants for registration have practical experience relevant to the discipline of engineering. The minimum requirement is two years of experience subsequent to completion of the BEng. It is recommended that, in addition to this, students obtain engineering experience in the summer periods prior to graduation.

Diploma in Engineering Admission Requirements

Students wishing to enroll in the Diploma in Engineering Program in the Department of Engineering must satisfy the requirements for admission to the Faculty of Arts and Science at Dalhousie and must also satisfy the additional requirements of the Department of Engineering. Students are normally expected to have completed Nova Scotia Grade XII senior matriculation classes, or equivalent, in Mathematics, Physics and Chemistry and should rank well in their class. Students may be admitted with advanced standing.

Admission with Advanced Standing

Students wishing admission with advanced standing in the Diploma in Engineering Program are advised that normally a minimum of seven full credit classes of those described for the program must be taken at Dalhousie. Transfer credit will not be granted for any class in which the final grade was less than C, or equivalent, or for any class in which a final grade was granted conditionally. Moreover, summer school classes are normally required as part of any Engineering program incorporating advanced standing. Students must obtain agreement for such programs, prior to the start of the Summer School session which precedes the next regular session, from the Department of Engineering.

Diploma in Engineering Program

The program is organized on a term basis although some classes are of two terms duration. Terms I and II are Year I; Terms III and IV are Year II.

Term I: Engineering 1100A, Mathematics 1280A, Chemistry 111R, Physics 1100R, and one elective*

Term II: Engineering 1120B, Mathematics 1290B, Chemistry 111R, Physics 1100R, and one elective*

Term III: Engineering 2121A, Engineering 2230A, Engineering 2240A, Engineering 2340A, Mathematics 2480A, and one elective*

Term IV: Engineering 2222B, Engineering 2101B, Engineering 2341B, Mathematics 2490B, and one elective*

The electives shown with an asterisk are to be selected from the humanities and social sciences. In the first year the elective must be selected from an approved list of classes in which written work is considered frequently and in detail. Students should seek the advice, and they must obtain the approval, of the Department of Engineering for these electives.

BSc/Diploma in Engineering

Students may arrange programs leading to a BSc with a major in one of the physical sciences in combination with the Diploma in Engineering. Upon completion of the joint program, graduates receive both the Diploma in Engineering and a BSc degree.

The program for the BSc plus Diploma in Engineering consists of fifteen classes. Eleven of the classes are the classes for the Diploma in Engineering. The remaining classes must be chosen to meet the requirements for the BSc. One of these requirements is that there must be four classes beyond the first year in the science major. If the science major is mathematics, physics, or chemistry, then the recommended first year program is the first year of the Diploma in Engineering. The second and third years each consist of approximately half of the remaining requirements for the Diploma and half of the requirements for the BSc. If the science major is computing science, biology, or geology, then students should seek the advice of the Department of Engineering, prior to registration in first year.

Classes Offered

Texts shown are for the previous year.

- 1100A Graphics:** lecture 2 hours, lab 3 hours, R.C. Gilkie, D.M. Lewis, E.N. Patterson. In this class the basic problem of representing three-dimensional solid objects on a twodimensional sheet of paper is solved by a variety of methods. Problems of the type involving points, lines, planes, solid objects, projections, pictorial views, intersections and developments, and freehand sketching are assigned on a weekly basis. Text: Engineering Graphics and Descriptive Geometry in 3-D, Pearce.
- 1120B Statics:** lecture 3 hours, lab 3 hours. E.N. Patterson, R.C. Gilkie. Prerequisite: Mathematics 1280. Statics is the first in a sequence of three classes in Engineering Mechanics. The others are Engineering 2121 and Engineering 2222. The work in Statics is designed to instruct the students in concepts of force and equilibrium. Topics include a review of the laws of motion, elements of vector algebra, such quantities as position and force vectors, moments of a force about an axis, couple moments, equivalent force systems, equilibrium of two and three-dimensional structures, two-dimensional frames and simple machines, shear forces and bending moments in beams, laws of Coulomb friction, centroids, area moments, and moments and products of inertia. Text: Engineering Mechanics: Statics, Hibbeler
- 2101B Engineering Design:** lecture 3 hours, lab 3 hours, D.M. Lewis, E.N. Patterson, W.W. Spencer. Prerequisites: Engineering 1100, 1120, 2240; Math 1280, 1290, 2480. Co-requisites: Engineering 2331, Math 2490. The work of 1100A Graphics is extended to include technical drawings and computer graphics, a design project with working drawings and a technical report, as well as the construction and testing of physical models.
- 2121A Dynamics of Particles:** lecture 3 hours, lab 3 hours, J.C. MacKinnon, M.H. Mansour, W.G. Speirs. Prerequisites: Engineering 1100, 1120; Mathematics 1280/1290. Co-requisites: Engineering 2240, Math 2480. This second class in Engineering Mechanics considers the kinematics and kinetics of a single particle and of systems of particles. The class builds on the concepts introduced in Engineering 1120, Statics; a vector approach is used. Topics include kinematics of a particle, Newton's laws, work, energy, power, conservative force fields, linear impulse and momentum, impulsive forces, impact, collisions, and angular momentum. All topics are treated using rectangular, path, and cylindrical coordinates. Text: Engineering Mechanics: Dynamics, Hibbeler
- 2222B Dynamics of Rigid Bodies:** lecture 3 hours, lab 3 hours, D.G. Retallack, M.H. Mansour, C.R. Hazell. Prerequisites: Engineering 1120, 2121, 2240; Math 1280, 1290, 2480. Co-requisite: Math 2490. This class completes the study of Engineering Mechanics. The concepts introduced in Engineering 2121, Dynamics of Particles, are extended to rigid bodies. Topics include kinematics of a rigid body using both the translating reference frame theory and the general rotating reference frame theory, kinetics of plane motion of rigid bodies including general plane motion, energy methods, impulse and momentum methods and vibrations of single degree of freedom systems. Text: Engineering Mechanics: Dynamics, Hibbeler.
- 2230A Electric Circuits:** lecture 3 hours, lab 3 hours, S.T. Nugent, O.K. Gashus. Prerequisites: Physics 1100, Math 1280, 1290. An introduction to the fundamental laws of electric circuits and circuit parameters, the concept of time-constants, impedances, admittances, general network theorems, three phase circuits and transformers. The laboratory periods illustrate the use of electrical measuring devices. Text: Circuits, Devices and Systems, R.J. Smith
- 2240A Computer Methods in Engineering:** lecture 3 hours, tutorial/lab 3 hours, E.N. Patterson, D.G. Retallack, E.A. Gunn. Prerequisites: Engineering 1120; Math 1280, 1290. This class first introduces the student to computers in general and to our machines in particular, to the use of an editor for creating computer programs, and to the design and running of simple programs. The class then focuses on an algorithm-design process which uses structured programming techniques and is independent of the language chosen for coding. MS BASIC is used as the implementation language, and is taught to an intermediate level. Typical assignments involve computer solutions of engineering and mathematical problems.
- 2331B Strength of Materials:** lecture 3 hours, lab 3 hours, E.N. Patterson, M.H. Mansour, W.G. Speirs. Prerequisites: Engineering 1100, 1120, 2240; Math 1280, 1290, 2480. This class is an introduction to the study of the stresses, strains, and deformation of a solid body which results when static forces are applied to the body. Topics discussed include: the definition and transformation relation of stress and strain, axial loading applications, torsion of circular sections, stresses and deflection of beams, combined static loading, column action. Text: Mechanics of Engineering Materials, Bowes, Russell, Suter.
- 2340A Classical Thermodynamics:** lecture 3 hours, tutorial/lab 3 hours, J.D. Cousens, J.C. MacKinnon, P.L. Allen. Prerequisites: Mathematics 1280, 1290; Chemistry 111. Co-requisite: Engineering 2240. This class delivers a general, but rigorous, presentation of the fundamentals of classical thermodynamics which is comprehensive enough to provide the basis for further study. The mathematical presentation requires an understanding of the concept of a partial differential equation but the content stops short of mathematical manipulation of the Fundamental thermodynamic relationships. The rudiments of engineering design are emphasized throughout the presentation of the First and Second laws, with the attendant concepts of energy, enthalpy, entropy, reversibility, availability and efficiency. The content includes analysis of some real power and refrigeration cycles and presents entropy in terms of the concept of unavailable energy of a system. Some problems are solved by computer methods. Text: Thermodynamics for Engineers, Karlekar, Prentice Hall (1983); Chs. 1 through 8.
- 2341B An Introduction to Fluid Mechanics:** lecture 3 hours, lab/tutorial 3 hours, J.C. MacKinnon, J.D. Cousens, P.A. Tanguy. Prerequisites: Engineering 1120, 2121, 2340, 2240; Mathematics 1280, 1290, 2480. This class completes the study of mechanics by extending the basic concepts from solids to fluids. It comprises the study of fluids in motion and at rest, their properties and impacts on their boundaries. The class content is, basically, the application of energy, momentum and mass conservation statements to fluid systems. Dimensional analysis is introduced. Laboratory experiments supplement tutorial sessions and some problems and projects involve the use of computer methods. Text: Fluid Mechanics, F.M. White.

English

Chairperson of Department

J.B. Stovel

Professors

J. Fraser, MA (Oxon.), PhD (Minn.)

J. Gray, MA (Aberd.), MA (Oxon.), PhD (Montreal), FRSC, FRSA, *McCulloch Professor*

A.E. Kennedy, BA, MA (UBC), PhD (Edinburgh)

M.G. Parks, MA (Dal), PhD (Tor.)

M.M. Ross, OC, BA, (UNB), MA (Tor.), PhD (Corn.), D Litt (UNB), LLD (St. Thom.), D Litt (Trent), FRSC, *Professor Emeritus*

R.J. Smith, BA (Natal), MA (Oxon.), PhD (Natal)

S.E. Sprott, MA, B.D. (Melb.), PhD (Col.) *George Munro Professor of English Literature*

D.P. Varma, MA (Patna), PhD (Leeds)

Associate Professors

J.R. Baxter, BA, BEd, MA, PhD (Alta.)

S.A. Cowan, BA (Montana), MA (Yale)

R. MacG. Dawson, MA (Tor.), M Litt (Oxon.)

R.M. Huebert, BA (Sask.), MA, PhD (Pitt.)

MA Klug, BA (Minn.), MA (Kan. State), PhD (Ill.)

P. Monk, BA (Reading), MA (Carleton), PhD (Queen's)

C.J. Myers, BA (Sask.), MA, PhD (Tor.)

J.B. Stovel, BA (Sir G. Wms.), MA (Cantab.), PhD (Harv.)

R.R. Tetreault, BA (UBC), MA, PhD (Corn.)

J.A. Wainwright, BA (Tor.), MA, PhD (Dal)

H.S. Whittier, BA (U.S. Naval Acad.), MA (New Hamp.), PhD (Yale)

Assistant Professors

M.M. Furrow, BA (Dal), MA, MPhil, PhD (Yale)

B. Greenfield, BA (York), MA (McG), PhD (Columbia)

H.E. Morgan, BA (UBC), MA (Wash.), B Litt (Oxon.), PhD (Wash.)

D. McNeil, BA (Concordia), MA (UNB), PhD (McMaster)

M.I. Stone, BA (Guelph), MA, MPhil (Wat.), PhD (Tor.)

Adjunct Professors

N.F. Budgey, MA (Glas.), DPhil (Marburg), D.Litt. (Geneva Coll.)

R.L. Raymond, BS (Yale), MA (Tor.)

The study of English literature at Dalhousie is not just the study of the literature of England. Although largely concerned with the rich written heritage of the British Isles, it also includes the study of writing in Canada, the United States, parts of the English-speaking Commonwealth and, indeed, some European countries, in translation.

It ranges widely in time from early Anglo-Saxon works of the eighth century through thirteen centuries of changing ideas and language to the still-changing thoughts, feelings and expressions of our own time. The many forms that the written word may take — poetry, fiction, drama, essay, history — are read, not only for an understanding of the literary evolution that brings them to be what they are, but also for an understanding of that which is temporary and that which is more enduring.

The purpose of English studies at Dalhousie, briefly stated, is the enjoyment and understanding of the written word. Since the word is the principal link between the individual heart and mind and the rest of the world, such studies naturally touch upon philosophy, politics, religion, and the fine arts as well. At the same time, the student is required to think, and to use language with clarity, judgement and imagination.

In more detail, the goals of English studies are to perceive that reading is a source of pleasure, knowledge and wisdom, to sharpen the powers of discrimination between what is good and bad in literature and ideas, to gain some understanding of the process by which great writing is achieved and indeed to inspire students to their own best expression.

In the first year, English 100 is required of all students who wish to take further English classes. There are some thirty different sections ranging from historical surveys to more eclectic studies. To enable students to choose the one most suited to their inclinations and needs the English Department and the Dean of Freshmen's Office have an English 100 supplement which includes the aims and reading lists of each section.

Classes numbered from 200 to 244 are especially suited for those concentrating in English, studying it as a complement to their main area, or taking an elective, and classes beyond 250 are designed as studies of specialized areas for Honours students. Honours classes are open to General students with permission of the Chairman and the professor concerned. A supplement describing Upper-year General and Honours classes in detail is available from the English Department.

Degree Program

BA Program

Students in the BA program must take from four to eight classes in English beyond 100. The Department expects all of its students to consult with faculty advisors and to form coherent programs of study; it strongly recommends that these programs contain at least six classes in English beyond 100.

English majors must take at least one class from each of the following groups, unless they have departmental permission to use an honours class to meet a group requirement.

GROUP I: English 207, 209, 210, 211, 212, 213, 231, 232, 233, 234.

GROUP II: English 205, 206, 208, 215, 218, 219, 224, 229.

GROUP III: English 200, 201, 202, 203, 204, 214, 216, 220, 225, 226, 227, 228, 244.

The purpose of the requirements stated above is to ensure some variety in each student's program. The Department recommends that the student take at least one class that concentrates on poetry and one that concentrates on fiction, and at least one class from each of two different historical periods. There is, of course, more to a sound program than variety. From the Department's offerings, students may approach the study of English literature in a number of different ways. They may choose programs which offer a broad historical background, which focus on specific genres or which concentrate on specific historical periods such as the 19th or 20th century. There are numerous other possible combinations. In any case, students should give careful consideration to planning their programs to meet their individual needs and interests, and should consult with their departmental advisor if they need help in doing so.

The following program of study is recommended for English majors intending to become teachers of English at the high-school level:

200 Advanced Composition, or 201 The English Language, or 202 History of the English Language

207 Canadian Literature

214 Shakespeare

228 The Short Poem in English, or 215 Romantic Poetry, or 210 Modern Poetry in English

220 English Drama, or 226 Tragedy, or 227 Comedy and Satire, or 232 Modern Drama

208 English Novel to 1900, or 209 Modern Fiction, or 212 British Literature of the 20th Century, or 213 American Literature of the 20th Century

At least one class chosen from the last three groups should involve a substantial amount of literature written prior to the 20th Century.

The student may also choose a maximum of two more classes in English.

Classes numbered from 200 to 244 (excepting 201, 202, 244) are not accepted as preparation for Graduate Studies in English. Students who may desire to change to an Honours Program or continue in Graduate Studies should arrange with their advisor and with the Chairman of the Department to complete several Honours classes before graduating with a General BA. It is possible to enter a two-year MA course on completion of a General BA degree, but only if the student has completed four or five Honours rather than General classes for the concentration and has attained at least a second-division average in them.

The BA with Honours in English (Major Program)

The Honours course in English offers a systematic study of the major writers and trends from mediaeval times to our century. It is therefore of particular relevance to the student who is interested in detailed study of English as a basis of a liberal education, to the prospective high-school teacher of English who needs a comprehensive understanding of the subject, and to the student intending to proceed to the graduate study of English and to complete in one year the requirements for the MA degree.

Students intending to enter the Honours course in Year II must consult the Department in advance to plan their course and be formally enrolled. In the subsequent years, Honours students are encouraged to seek advice of the Department in choice of classes.

The Honours course consists of nine classes (in addition to English 050) beyond English 100. At least one class must be taken from each of the following six sections:

Section A: English 252 (recommended for third year)

Section B: English 253, English 351

Section C: English 251, English 352

Section D: English 254, English 356

Section E: English 354, English 355, English 452, English 457

Section F: English 357, English 453, English 455

The student may choose the three remaining classes from those not already chosen in Sections B to F, or from Section G: English 201, 202, 244.

Introduction to Literary Research

English 050, a non-credit class which meets one hour per week, is required of all Honours students and is to be taken in the first year of the Honours course.

Honours students must meet the requirements for the General BA degree. They are advised to select a minor from one of the subjects listed under either Group A or Group B in the "Academic Programs" section of the Calendar.

BA with Combined Honours

There are several Combined Honours programs: English and French, English and German, English and History, English and Philosophy, English and Spanish, English and Theatre. Students interested in any of these combinations or any other that involves English and another subject should consult with the Departments concerned.

Classes Offered

100 Introduction to Literature: lecture 3 hours, members of the Department. Since English 100 consists of sections taught by many different instructors, statements about its objectives and approach must be confined to generalizations. All instructors of English 100 have these two broad objectives in common: (a) to involve students in the serious study of literature; (b)

to involve them in the discipline of words so that they will be more critical and responsive readers and more exact and imaginative writers. The subject matter varies from section to section. Detailed syllabi of all sections are available. Practice in writing is carried on throughout the year in fortnightly essays. Each section attends three lectures per week. In addition, the tutors attached to each session conduct small discussion groups and personal interviews with students.

Classes for General Degree

Successful completion of English 100 is the prerequisite for entry into Upper-Year classes.

For a more complete description of classes and of texts, students should consult the Departmental Supplement for Upper-Year classes. Not all classes shown are taught every year.

(Tentative List)

200 Advanced Composition: lecture 3 hours, P. Monk. Prerequisite: English 100. An advanced class in the theory and practice of writing English prose, designed for people who already have some competence and interest in writing. The class is *not* a "remedial" class and *not* a "creative writing" class.

201 The English Language: lecture 2 hours, M.M. Furrow. This class, concerning the English language of today, begins with some general questions about the nature of language, and goes on to investigate the syntax, semantics, phonology, and dialects of modern English, with an ultimate interest in the stylistic analysis and comparison of short literary texts.

202 History of the English Language: lecture 2 hours, R. MacG. Dawson. An introduction to the historical development of the English language. The growth of our "word-hoard," the evolution of word meanings, the changing patterns of speech sounds, of word forms and of syntactic structures, the distinction of dialects and literary styles are studied through analysis of selected literary texts. English 201 and 202 are complementary classes.

203 Masterpieces of Western Literature: lecture 3 hours, H. Whittier. Intensive reading of selected major works from Western literature, is designed to broaden the student's outlook on literature and also to increase his familiarity with works that are not only stimulating in themselves but also comprise the basis for the development of English and other literatures.

204 The European Novel: lecture 2 hours, An intensive study of about ten representative European novels of the last two hundred years. A considerable amount of attention is paid to the philosophical ideas which are an important feature in many of the novels studied.

205 Landmarks of English Literature: lecture 3 hours, R.R. Tetreault, B. Stovel. This class studies works by many of the most influential British authors from Chaucer to the present century. These landmarks provide some orientation in the literary landscape, and help to make students aware of the diversity available in literary studies. The class is aimed at, but not limited to, English majors.

206 American Literature of the Nineteenth Century: lecture 2 hours, S.A. Cowan. An introduction to American literature through representative works by major writers from 1800 to 1900. Among those studied are Cooper, Hawthorne, Poe, Emerson, Melville, Whitman, Dickinson, and Twain. Both fiction and poetry are studied. Students are encouraged to discuss the works, and classes usually proceed by a combination of discussion and lecture. This class may be taken for Honours credit.

207 Canadian Literature: lecture 2 hours, M.G. Parks. This class is a selective survey of Canadian prose fiction and poetry from colonial times to the 1960's. It includes twelve prose works and selections from the following

ENGLISH

poets: Goldsmith, Howe, Crawford, Roberts, Carman, Lampman, D.C. Scott, Pratt, Smith, F.R. Scott, Klein, Birney, Layton, Page, and, if time permits, one or two of the younger poets.

208 The English Novel to 1900: lecture 2 hours, H.E. Morgan, M. I. Stone. Based on a selection of titles by representative authors, this class is a survey of the early English novel. Attention is given to the rise of the genre as well as to the variety of forms and functions which the novel assumed or served.

209 Twentieth-Century Fiction: lecture 2 hours, R.J. Smith, J.A. Wainwright. An introduction to the main thematic and technical trends in the modern novel. Each section has its own emphasis and choice of texts.

210 (Formerly 301) Modern Poetry in English: lecture 2 hours. A study of modern poetry in English is based on the seminal poets Yeats, Stevens, Pound, Eliot, and Williams; then selected developments of poetry from the 1930's to the present are considered. For readers, beginning and more experienced, who wish to get their bearings in modern poetry.

211 Commonwealth Literature: lecture 2 hours, R.J. Smith. An introduction to the literature of the British Commonwealth, excluding that of Canada and the British Isles. Writing from Africa, Australia, the Caribbean and India will be discussed and common problems or themes examined. The bulk of the literature studied will be modern.

212 British Literature of the Twentieth Century: lecture 2 hours. A survey introduction to the past seventy-five years of British fiction, drama, and poetry.

213 American Literature of the Twentieth Century: lecture 2 hours, B. Greenfield. An introduction to poetry, fiction and drama by American poets and novelists of the Twentieth Century.

214 Shakespeare: lecture 2 hours, M.M. Furrow, R.M. Huebert. An introduction to Shakespeare's career as a playwright, through discussion and interpretation of a dozen or more of his plays.

215 Poetry of the Romantic Period: lecture 2 hours, D.P. Varma. An introduction to the spirit of an age and its manifestations in literary art. Examples of shorter and longer lyrics and excerpts from longer narrative and dramatic poems are drawn from the works of Blake, Wordsworth, Coleridge, Byron, Shelley, and Keats. Although devoted to the study of a period, the class begins with a general introduction to the reading of poetry.

216 The Gothic Novel: lecture 2 hours, D.P. Varma. A survey of the origins and development of *The Tale of Terror and Supernatural* during the later half of the eighteenth century and its various manifestations and influences in succeeding fiction. Not only the chief landmarks of gothic fiction will be charted, but the students also explore the various chambers of horror-literature.

218 Mediaeval Literature: lecture 2 hours, H.E. Morgan. A study of selected mediaeval works of Northern Europe, with major emphasis upon the Arthurian legend as found in Malory. Beginning with a look at Nordic, Celtic and Frankish background materials (in translation), one goes on to focus upon late-mediaeval developments in saga and romance, concluding with a look at some post-mediaeval uses of the inherited matter in Tennyson, Morris, Lewis and Tolkien.

219 Chaucer and his Contemporaries: lecture 2 hours, M.M. Furrow. A selection from the genres of late mediaeval literature in English: romances, fabliaux, plays, lyrics, and legends. Some works are studied in translation; others (including Chaucer's) are read in the original Middle English.

220 English Drama: lecture 2 hours, R.M. Huebert. An introduction to some of the major plays and playwrights in the history of English drama. Special emphasis is given to plays by such leading dramatists as Marlowe, Webster, Wycherley, Shaw, Pinter, and Stoppard. Some attention is paid to the principal changes in staging practices from the mediaeval beginnings of English drama to the recent experimental theatre. The objective of the class as a whole is to sample the richness and diversity of the English dramatic tradition.

224 Renaissance Poetry: lecture 2 hours, J.R. Baxter. An introduction to English poetry from the early sixteenth to the mid-seventeenth century, concentrating on authors whose works have exercised a continuing influence: Sidney, Spenser, Shakespeare, Donne, Jonson, and Milton.

225 Epic, Romance, and Fantasy: lecture 2 hours, P. Monk. This class offers a consideration of epic, romance, and fantasy. Starting with a consideration of primary epics it will then go on to take a look at some literary epic spirit as manifest in modern works.

226 Tragedy: lecture 2 hours, R.R. Tetreault. A study of the nature and method of tragedy in literature. Examples are taken from Greek, Shakespearean, and modern drama, as well as from poetry, and from novels.

227 Comedy and Satire: lecture 2 hours, J. Gray, B. Stovel. The comedian and the satirist are interested in both the laughable and the deplorable antics and eccentricities of human nature. This class concerns itself with their points of view, as expressed in such varied forms as stage comedy, graphic satire, the comic novel, and the humorous essay. It also considers theories of comedy and laughter in their application to a wide variety of literary types. Lectures and class discussions are augmented with play readings, films and other illustrative materials.

228 Short Poems in English: lecture 2 hours, A. Kennedy. Forms and themes in the short poem are studied by means of critical reading of poems written in English. Topics may include the following: the self in the short poem, other persons, public events, love, nature, the city, the machine, wit, myth, traditional forms, free verse, the hokku, lyric as song, spoken poetry, poetry in print, concrete poetry, and possibly other topics to suit the class.

229 Victorian Poetry: lecture 2 hours, M.I. Stone. The poetry of Tennyson, Browning and Arnold with some attention to works by Swinburne, the Rossettis, and Morris. The poetry is studied against the intellectual context of the Age, that is, the social and political, the religious and scientific, and the philosophical ideas current in Victorian England. Attention also focuses on the poets' concern with how best to speak to their audience, a concern which raises questions of poetic theory and form.

231 Modern American and Canadian Novels: lecture 2 hours, M.A. Klug, members of the Department. Six Canadian and six American novels are treated as related "pairs," with the instructors dividing their time equally between the two sections. Both sections and both instructors meet together to discuss each pair of novels, after the novels have been dealt with individually.

232 Modern Drama: lecture 2 hours, R.M. Huebert. An introduction to the major developments in drama from Ibsen to the present. Special attention is given to changes in dramatic style and to the growth of modern theatrical movements. The playwrights represented include Strindberg, Shaw, Pirandello, Brecht, Genet, Ionesco, Pinter, Albee, and Stoppard. A few recent Canadian plays provide a focus for discussion of contemporary trends.

233 Science Fiction and Fantasy: lecture 2 hours, S.A. Cowan. Selected works of speculative fiction are read for pleasure and studied for understanding. The study emphasizes analysis and evaluation of the works as

literature. Each student is responsible for self-disciplined study of the history of science fiction and may expect to be examined in detail on his knowledge. Non-majors are welcome.

234 The Short Story: lecture 2 hours, A. Kennedy, J.A. Wainwright. This class attempts to combine detailed consideration of a wide range of the best short stories of the last 150 years with discussion of general questions about the nature of the genre itself. As much as anything else it is a class in 'reading and writing' intended to improve reading ability and to develop the capacity to understand and interpret literature.

244 (formerly 454) Literary Criticism: lecture 2 hours, A. Kennedy. A survey of Classical Greek and Latin theory, English critics and some pertinent European writers and trends.

Classes for the Honours Degree *(tentative list)*

050 Introduction to Literary Research: lecture 1 hour (first term only), C.J. Myers, H. Melanson. A departmental (i.e., non-university and non-credit) technical class for honours and graduate students. It is planned to acquaint the student with certain research tools in the library that are most frequently used by students of English (bibliographies, catalogues, indices, digests, journals, dictionaries, microfilms), many of which the student is unlikely to stumble upon himself in his own research. The class also includes instruction in the technical aspects of writing papers (planning, research methods, footnotes, bibliographies), and some discussion of the history of printing insofar as it relates to the establishment of texts, particularly older ones. The class includes the assignment of an exercise to be done in the library.

251 Sixteenth-Century Non-Dramatic Literature: lecture 2 hours, M.G. Parks. The poetry and prose of the English Renaissance from its beginnings up to the 1590's. The main writers studied are More, Sidney, Spenser, and Shakespeare. There is also some exploration of the work of a selection of other writers, such as Elyot, Hooker, Wyatt, Surrey, Daniel, Davies, Marlowe, Nashe. The literature studied is part of a culture very different from our own. Therefore some attempt is made to understand the two main traditions, the classical and the Christian, as they influence and even permeate the literature of the century. As the bulk of required reading in prose and verse is not great, there is time for some background reading and study.

252 Shakespeare and the Drama of His Time: lecture 2 hours, J.R. Baxter. About fifteen plays by Shakespeare, some by choice of the class, are read in the context of representative plays by his earlier and later contemporaries, especially Marlowe and Jonson. Students may consult the professor for a list of plays and suggested preliminary reading.

253 Old English: lecture 3 hours, R. MacG. Dawson. An introduction to the Old English language (700-1100 AD), followed by a study of some of the prose and minor poems, and, in the second term, of *Beowulf*. Students are also introduced to some aspects of Old English art and archaeology. Some knowledge of a classical or modern European language (preferably German) is desirable, though not essential, and an understanding of traditional grammatical terminology will be helpful. This class is not recommended, except in unusual circumstances, to those who are not thoroughly fluent in modern English.

254 Restoration and Eighteenth-Century Literature: lecture 2 hours, J. Gray, D. McNeil. The emphasis is on three great satirical authors (Dryden, Pope, and Swift), on a study of Restoration drama and on major works of Samuel Johnson. Since the literature of the period is related closely to the men and manners of the age, some time is spent on the contemporary climate of opinion revealed in the works of a number of writers representative of literary, political, social, and philosophical points of view: Hobbes, Halifax, Pepys, Rochester, Butler, Addison and Steele, Mandeville and Shaftesbury.

351 Middle English: lecture 2 hours, H.E. Morgan, M.M. Furrow. An introduction to the language and literature of feudal and chivalric England, with the principal emphases being upon Chaucer's poetry and upon the Arthurian story. Through readings and study, the student should gain some historical sense of the language, of the late-medieval social milieu and of the especial flourishing of literature in the late-fourteenth century.

352 Seventeenth-Century Non-Dramatic Literature: lecture 2 hours, R.M. Huebert. The poets represented here include Donne, Jonson, Herbert, and Marvell; the prose writers range from Hobbes to Bunyan. If a single writer's voice stands out — even in a century of unusual talent and great achievement — it is Milton's, especially the epic voice of *Paradise Lost*.

354 Victorian Novel: lecture 2 hours. The novels of the period from Scott and Austen to Hardy are studied.

355 American Literature to 1900: lecture 2 hours, B. Greenfield. This class deals with major writers of the 19th century, as well as works from the colonial period which raise important cultural questions.

356 The Romantic Period: lecture 2 hours, R. Tetreault. A close reading of the major poetry of Blake, Coleridge, Wordsworth, Byron, Shelley, and Keats. Attention is also given to their critical writings in prose, and to the intellectual, cultural, and historical milieu in which they worked.

357 Modern Canadian Literature: lecture 2 hours, A. Wainwright, P. Monk. A study of Canadian fiction and poetry since the Second World War with emphasis on the changing form and content of Canadian writing. Classes consist of lectures and discussion.

360C Old Norse: lecture 1 hour, H.E. Morgan. Prerequisite: One of English 218, 253, 351 or instructor's permission. A broad survey of major Old Norse prose and poetic works in translation and an introduction to the comparative study of the very close relation of the early Norse and English languages and literature.

452 Nineteenth-Century Prose and Thought: lecture 2 hours, C.J. Myers. The study of representative non-fictional prose works of the nineteenth century, for their intrinsic merits, with the object of exploring the ideas of the period about politics, religion, education, art and society. Instruction is chiefly by means of lectures, but there are ample opportunities for class discussion, and each student presents one seminar paper.

453 Twentieth-Century English Literature: lecture 2 hours, J. Fraser. Primarily for honours students and for MA students in their make-up year. Each member of the seminar writes two papers to serve as starting-points for the class discussions. There are no examinations, but regular attendance is expected in the interests of effective debate.

455 Modern American Literature: lecture 2 hours, M.A. Klug. In the first term, this class studies 20th-century American fiction. In the second term, modern American poetry is assessed. Classes are a combination of lectures and discussion.

457 Victorian Poetry: lecture 2 hours, C.J. Myers, M.I. Stone. The major poetry of Tennyson, Arnold, and Browning with some attention to the Pre-Raphaelite School. The poetry is studied within the intellectual context of the Age, that is, the social and political, the religious and scientific, and the philosophical ideas current in Victorian England.

Graduate Studies

The Department offers graduate classes leading to the degrees of MA and PhD. Details relating to admission, scholarships and fellowships, requirements for the degree, classes of instruction, etc., can be found in the Calendar of the Faculty of Graduate Studies.

French

Chairperson of Department
M. Bishop

Professor Emeritus
P. Chavy, Agrégé des Lettres (Paris), Chevalier de la Légion d'Honneur

Professors
H.F. Aikens, BA (Dal), AM (Yale)
M. Bishop, BA, BEd (Manch.) MA (Man.), PhD (Kent, Canterbury)
R. Kocourek, State Examination, PhD, CSc (Charles U., Prague), *McCulloch Professor, (Graduate Coordinator)*
D.W. Lawrence, BA, MA, PhD (Lond.)

Associate Professors
J.W. Brown, AB (Miami), MA (Middlebury), PhD (Penn.)
B.E. Gesner, BA (Kings), BEd, MA (Dal), Dr. de 3e cycle (Toulouse, II)
W.T. Gordon, BA, MA, PhD (Tor.)
H.R. Runte, MA, MPh, PhD (Kansas)
M. Sandhu, Licence ès Lettres (Montpellier), PhD (Yale)
N. Trèves-Gold, BSc (American U., Cairo), PhD (Rice)
K. Waterson, BA (Long Island), MA (NYU), PhD (CUNY)

Assistant Professors
E. Boyd, BA (SMU), BEd (St FX), MA (Middlebury)
P. DeMeo, BA, MA, PhD (UCLA)

Adjunct Professor
R. Runte, BA (SUNY), MA, MPh, PhD (Kansas)

The Department of French offers students not only the opportunity to develop fluency in classes backed up by excellent laboratory and ancillary facilities, but also the possibility of studying the literature and culture of France, French Canada and the other nations of the French-speaking world, and the linguistic structure and development of French.

Classes are available for beginners and for those with a background in the language who wish to improve and maintain any or all of the following skills: speaking, listening, reading, and writing. Other classes are specially designed for students who are interested in teaching, translation, or other areas of language study. The role of French in Canada and in the Maritimes is stressed in classes in Acadian and Québécois literature and civilization. The literature of France and French-speaking nations is brought to life in classes organized around a theme, a genre, or a historical period.

The Department of French urges students to practise the language as much as possible. The *Maisons Françaises* are two houses on campus in which students may live with native speakers in a francophone environment. The French Club organizes many activities including films, French meals, parties and plays in which all students may participate. Exchanges with Québec and individual student travel and study are encouraged. Normally the Department offers at least one course off campus in a francophone environment. In the past we have offered an intensified version of French 3000B in Mayenne, France and in Saint-Pierre and Miquelon. Please consult the Department for information concerning schedule and any bursaries that may be available.

A BA degree in French with Honours or with Honours in French and another subject combined may lead the student to a career in education, written or oral translation, or may provide the background for careers in many fields, including radio, television, law, social work, public relations, business, diplomacy, journalism and library science. Students considering French as an area of concentration in a BA degree course are invited to

discuss the matter at any time (the earlier the better) with a member of the Department. The accent is on the particular needs and aspirations of the individual. An Honours degree is normally required for access to graduate studies and an MA or MAT degree may be pursued in the Department (see the Calendar for Faculty of Graduate Studies).

Major or honours students may, with the approval of the Department of French, take up to one year (5 full credits) of work at a University in a francophone environment and receive credit at Dalhousie.

Degree Programs

BA Program

Students should consult the Chairperson or a Department Adviser about their choice of classes. The Department expects students majoring in French to form coherent programs of four to eight full classes or equivalents beyond 1020R or 1000R/2000R. These programs might be in one of these streams, for example: General, Language and Linguistics, Literature, Civilization, French-Canadian Studies. Students should note that:

All majors are normally required to take at least one full credit from 2021A/2022B and 2040R.

All majors are required to take one or more full credits in their second year from: 2110A/2111B, 2201A/2202B or 2030A/2030B.

All majors are required to have a counselling session at the end of their second year (or before classes begin in the Fall of their third year). If advised at that time, they may be required to take 3040R.

All majors are normally required to take one 3000-level class other than 3040A/3041B and are encouraged to take other classes on this level.

There is no bar to changing to an Honours Program after the second year of studies. Students wishing to do so, or to continue in Graduate Studies, should consult the Chairperson or the Honours Adviser.

BA with Honours in French

This program offers systematic, comprehensive and individualized study of French language and/or literature both within and without the classroom. It is, therefore, an option which should be considered seriously by any student who, with career or personal objectives in mind, wishes to obtain a strong background in French and by those who plan to teach or earn a graduate degree in French.

Honours students are strongly encouraged to enrich their more traditional learning experience by living in one of the *Maisons Françaises* and by spending at least one summer in a French-speaking area. Majors or honours students may, with the approval of the Department, take up to one year (five full credits) of work at a university in a francophone environment and receive credit at Dalhousie. Please consult department for information on programs available.

Financial support may be available. Please consult the Chairperson of the Department.

Students intending to enter the Honours program should consult the Honours Adviser to discuss their program as early as possible. It is recommended that eleven classes be taken beyond the first year level. Normally no more than three credits at the 2000-level and no more than five credits at the 3000-level may be included. The following outline is offered as a guide.

Year 1: French 1020R or 1000R and 2000R (either might be combined with 1060R).

Year 2: Three credits chosen primarily from: 2201A/2202B, 2040R, and 2030A or 2031B, plus other 2000-level classes.

Year 3: The equivalent of 4 full credits chosen from French 3000B, 3020R, 3040R, 3100R, 3200A/B, 3300A/B, 3400A/B, 3500A/B, 3600A/B, 3700A/B, 3800A/B, 3900A, 3901B, 3910A.

Year 4: the equivalent of 4 full credits chosen from French 4001A/B, 4002A/B, 4010A, 4011B, 4015R, 4041A, 4042B, 4300A/B, 4301A/B, 4400A/B, 4401A/B, 4500A/B, 4501A/B, 4600A/4601B, 4700A/4701B, 4710A/B, 4800A/B, 4801A/B, 4811A/B; a research paper or a comprehensive exam.

Classes Offered

1000R Français pour débutants/Beginners French: lecture 3 hours, language lab 3-6 hours, according to individual need. This class, intended for students with little or no previous instruction in French, covers a sufficient range of basic linguistic structures and high-frequency vocabulary to enable students to engage in simple, everyday communication on a variety of subjects. Classes are conducted in French as much as possible with a view to developing competence in "real-life" communication, both oral and written. Work done in the three class meetings per week is supplemented with both oral and written exercises in the Dalhousie Learning Laboratory and with reading assignments, compositions, and written exercises to be completed outside of class. Students are also introduced to significant aspects of French, French-Canadian, and other francophone cultures. Upon completion of French 1000, students wishing to complete the study of basic French language structures and to increase their written and spoken fluency should enroll in French 2000.

1010R Français pour débutants: Niveaux I & II/Beginners French: Levels I & II: lecture 6 hours, language lab 6-12 hours, according to individual need. This course offers highly motivated first year students the opportunity to do the work of French 1000R and 2000R, normally a two-year program, in one academic year. It thus offers double credit (12 credit hours). Registration by permission of the course coordinator only. (Credits awarded for French 1010 may not be counted towards a major in French.)

1020R Révision de français oral et écrit/Spoken and Written French in Review: lecture 3 hours, language lab 1-2 hours, according to need. This is the usual first-year class for those students who have studied French throughout high school. Designed to develop proficiency in speaking and listening skills, as well as in reading and writing. Classes are taught in French and involve much oral practice: discussions, exercises, etc. are based on a wide variety of reading and listening materials. Short written exercises and occasional compositions reinforce this work. The basic structures of French are reviewed. Listening comprehension assignments are done in the Learning Laboratory in the Killam Library. Agreement of adjectives, placement of object pronouns, etc. is assumed, since these and other items are dealt with as review items. Students with little or no acquaintance with such structures should seek departmental advice.

1060R Pratique de la lecture/French for reading: lecture 3 hours. Development of the ability to read contemporary French prose with ease and accuracy. Emphasis is on the acquisition of skills that facilitate reading. Students are encouraged to become familiar with the best French-English dictionaries and to use them judiciously, to learn large blocks of vocabulary by recognizing word families, and to grasp the meaning of unknown words from context wherever possible. Classroom work involves a grammar review, study and discussion of a wide variety of readings as well as correction of prepared translations and sight translations (from French to English only). French 1060 is given in English and is not, by itself, suitable for students who plan to major in French. It may, however, be taken by those with no prior training in French.

Note: All classes above this level are normally given in French.

2000R Français pour débutants: Niveau II/Beginners French: Level II: lecture 3 hours, language lab 3-6 hours, according to individual need. No student may enrol in French 2000 without having first completed French 1000. This class continues the work begun in French 1000, focusing on

more advanced forms of expression including the vocabulary, verb forms, and syntactic structures necessary for communication at a relatively high level of abstraction and complexity. As in French 1000, all classes are conducted as much as possible in French, with additional practice provided through the Dalhousie Learning Laboratory and through regular reading and writing assignments. Reading selections drawn from the press and the literature of French-speaking cultures continue to be a regular part of the work, in the interest of deepening and enriching the students' understanding of the people whose language they are studying. (Credit awarded for French 2000 may not be counted towards a major in French.)

2021A/2022B Etudes pratiques/Practice in Language Skills: lecture 3 hours. Follows 1020 or 1000/2000. It is normally taken in the second year of study and provides the opportunity to practice and improve language skills already acquired. Sections approach language learning through different subjects (such as Acadian studies, African and Caribbean civilization, cinema, journalism, the occult, or the detective novel). All classes and assignments are entirely in French. Students must choose sections with different topics to earn credit for both A and B. However, it is not necessary to take both A and B and students may elect to study one semester only. Students should consult the current timetable, as the topics offered change each year.

2023A/2024B Etudes pratiques II/Practice in Language Skills II: lecture 3 hours. For non-majors only. Permission of coordinator of French 2021 required. Open only to students having completed French 2021A/2022B. These classes provide the opportunity for further practice and improvement of language skills already acquired. As in 2021A/2022B, sections approach language learning through subject areas such as French Art, Technical and Commercial Vocabulary, Women in France and French Canada, etc. All classes and assignments are entirely in French. Students must choose sections with different topics to earn credit for A and B. The topics chosen for 2023A/2024B must also be different from those taken in 2021A/2022B. It is not necessary to take both A and B and students may elect to study one semester only. Students should consult the current timetable, as the topics offered change each year.

2025A/2026B Etudes pratiques III/Practice in Language Skills III: lecture 3 hours. For non-majors only. Permission of coordinator of French 2021 required. Open only to students having completed 2023A/2024B. Topics chosen must differ from those of all previous classes.

2030A/2030B De l'orthophonie à l'intonation expressive/From Corrective Phonetics to Expressive Intonation: lecture 3 hours, language lab, according to need. Prerequisite: French 1020 or equivalent. Using widely varied texts and recordings, this class studies the basic sounds (phonemes) of French and the essential non-phonemic features of the language (rhythm, stress, intonation, etc.). It helps students master French phonemes, understand the role of non-phonemic features in oral communication and develop self-expression and audio-comprehension.

2031A/2031B Interprétation/Simultaneous Translation: lecture 3 hours in language laboratory, supplementary lab hours, as necessary for individuals. Practical introduction, given in the language lab, to oral English-French and French-English translating (interpreting) with emphasis on fluency, vocabulary building and comparative syntactico-stylistic analysis.

2040R Introduction à la stylistique du français/Introductory Composition: lecture 3 hours. These classes constitute a detailed and comprehensive review of grammar by means of various exercises including dictations, translations, compositions and summaries. They involve a study of written style and manner of expression.

2110A/2111B Civilisation du Canada français/Civilization of French Canada: lecture 3 hours. The first part concentrates on the major historical

FRENCH

and political trends and events of French-Canadian society in recent years. An attempt is made to understand the problems facing the francophone minorities across the country, as well as those encountered by the Québécois of today. The second half examines French Canada in the light of its cultural output — such as music, theatre, painting, poetry, cinema, etc. These cultural aspects are studied not as aesthetic works but rather as artistic expressions of a particular society.

2201A/2202B Introduction à la littérature/Introduction to French Literature: lecture 3 hours. A survey of literature in French from the Middle Ages to the 20th century, presenting selected works of prose, poetry and theatre from France, Québec, Acadia and other francophone areas. Introduction to general notions of literary history and to the basic concepts involved in reading literary texts. Attention is paid to the development of both oral and written expression of ideas. French 2201A and 2202B may be taken consecutively. Classes involve, principally, group discussion, often based upon short individual presentations.

3000B Cours supérieur de français oral/Advanced Oral French Workshop: lecture 3 hours. Class discussions and oral presentations based on themes of contemporary concern. This class may be offered off campus in France in the summer in an intensive fashion. This class is intended to build vocabulary, perfect facility of expression (fluency) and style. Reading and research are necessary for the oral presentations.

3010R Phonétique/Phonetics: lecture 3 hours. Prerequisite: familiarity with the spoken forms of English and at least one other language. An introduction to the study of the sounds of language, with special reference to English and French: how these sounds are perceived and produced, their classification, practice in the use of phonetic symbols, basic phonemic theory (information on French pronunciation, but not primarily a class in remedial pronunciation).

3020R Linguistique/Linguistics: lecture 3 hours. This class has three main objectives: to explain the major branches of the modern study of language (pronunciation, spelling, morphology, syntax, vocabulary, meaning); to refine and systematize the students' understanding of French grammatical categories; to show how to identify, observe and analyze linguistic aspects of interesting texts. A class report on a linguistic topic of the student's choice is an important component of the class. Regular assignments and exercises complement the syllabus.

3025A/3025B Les parlers Acadiens: Introduction linguistique/Linguistic Introduction to Acadian Dialectology: Students wishing to take the course must have taken, be concurrently enrolled in French 3020R, or must seek the permission of the instructor. An examination of the phonetic, morphosyntactic and lexical systems of various Acadian speech communities, with emphasis on the Acadian dialects of Nova Scotia. Frequent comparisons will be made between these dialects and both standard French and Québécois. Recorded and written materials are used.

3040R Etudes pratiques de stylistique I/Intermediate Composition: lecture 3 hours. This class develops further the skills acquired in 2040R. Through a variety of exercises, students are taught to express themselves in clear, accurate, idiomatic French, and to perform a number of tasks of a practical nature: writing reports, summaries, letters, etc. A good knowledge of grammar is essential.

3081A/3082B Didactique du français langue seconde à l'école secondaire/Methods of Teaching French at the Secondary Level: lecture 3 hours. Open only to students who have demonstrated adequate competence in French language and culture (passing a French language proficiency exam is required). Students taking this class are normally completing a BEd. Other students interested must consult the instructor. A considera-

tion of foundations of second language teaching which moves to a discussion of methodology, techniques, materials (including visual aids), and testing. Emphasis is on developing teaching strategies which enable students to use French as a tool for authentic self-expression, orally and in writing. Directed observation of experienced teachers and practice in the development of teaching skills are integral parts of the class. Evaluation is based upon class participation (microteaching, oral reports, contributions to discussions), written projects, lesson plans, and examinations.

3085B Didactique du français langue seconde à l'école élémentaire et en immersion/ Methods of Teaching French in the Elementary School and Immersion: Prerequisite: Students must have enrolled in or actively audited French 3081A. This class focuses on specific methods and materials appropriate for the elementary-age child in the French core program and/or immersion.

3100R Civilisation de la France et du Canada français/Civilization of France and French Canada: lecture 3 hours. An attempt, through talks, reading and discussion, to understand and to suggest fruitful ways of studying, from an English-speaking Canadian point of view, what is essential in French and French-Canadian culture and outlook.

3200A/3200B Appréciation de la littérature/Literary Appreciation: lecture 3 hours. An approach to the critical reading of various periods of French literature. The class offers discussion of representative works of major writers, centering either on genre, theme, or period and involving close textual analysis. It also includes some discussion of past and current theories of literature. See department for specific details in any given year.

3300A/3300B La littérature médiévale/Mediaeval French Literature: lecture 3 hours. Textual analyses of selected works representing the major literary genres (epic, romance, theatre, poetry) from the *chansons de geste* to François Villon (most texts in modern French translations). The discussion of the origins and the development of a national French literature provide a convenient introduction to critical approaches to literary texts.

3400A La littérature du seizième siècle/16th-Century French Literature: lecture 3 hours. Reliving the awakening, bloom and decline of the Renaissance period in literature and language through the works of Marot, Rabelais, Du Bellay, Ronsard, Montaigne and the poets of the *baroque*. The century's concern with the French language provides a convenient introduction to the study of the development of modern French.

3500A/3500B La littérature du dix-septième siècle/17th Century French Literature: lecture 3 hours. The theatre in 17th century France: an examination of representative works by Corneille, Racine and Molière; an attempt to define these dramatists' vision of man and the world and to assess their contribution to the history of ideas and the development of French theatre.

3600A La littérature du dix-huitième siècle/18th Century French Literature: lecture 3 hours. An introduction to the literature of the 18th century which includes works by such authors as Voltaire, Rousseau, Diderot and Marivaux. Each year the readings and class discussions will be centered on a different theme (for example: the hero, women, love, wealth and power).

3700A/3700B La littérature du dix-neuvième siècle/19th Century French Literature: lecture 3 hours. An introduction to the main literary movements of the 19th century: Romanticism, Realism, Symbolism. Focus is on representative authors and/or texts belonging to one or more of these trends.

3800A/3801B La littérature du vingtième siècle/20th Century French Literature: lecture 3 hours. Poetry and Theatre, 1900-1985. Study of modern poetry from Dada and Surrealism to the work of contemporary poets such as Yves Bonnefoy, Jacques Dupin and Michel Deguy; and of modern theatre from Jarry to Beckett, Ionesco and beyond.

3900A/3901B La littérature canadienne française/French-Canadian Literature: lecture 3 hours. In-depth study of a few major works of French-Canadian literature with emphasis on the period from 1945 to the present day. Each class deals with a specific genre (e.g., 3900A Poetry, 3901B Novel) and choice of genre may differ from year to year.

3910A/3910B Etudes acadiennes/Acadian Studies: lecture 3 hours. Critical investigation into the historical, socio-cultural, linguistic and literary significance of past and present Acadian writing. May follow Acadian Studies (2021A/2022B).

4001A/4002B Histoire de la langue française/History of the French Language: lecture 3 hours. 4001A *Histoire du français — Moyen Age/History of French — The Middle Ages:* Advanced research into selected topics in Old and Middle French — manuscript studies; paligraphy; historical phonetics, morphology and syntax; the cultural-literary context of linguistic development; etc. 4002B *Histoire du français — Epoque moderne/History of French — The Modern Period:* Advanced research into selected topics — the emergence of a national language, the problem of orthography, usage and the development of normative grammars, the evolution of vocabulary, epochal phenomena (Rhétoriciens, the Baroque, Préciosité, the Revolution, scientific French, argot), etc.

4010A/4010B Grands Linguistes du vingtième siècle/Great Linguists of the 20th Century: lecture 3 hours. How did French-speaking linguists of the 20th century contribute to the understanding of the language? Interpretation of passages by six linguists (such as Saussure, Bally, Tesnière, Guillaume, Gougenheim, Martinet) will show how interesting questions were asked, and how new answers and methods enriched the field of language study. Class reports, discussions, assignments.

4011A/4011B Lexicologie/Lexicology: lecture 3 hours. How can French vocabulary be studied and structured? What is its formation (derivation, composition, metaphor, borrowing, abbreviation, etc.), its meaning, its development? Class reports, discussions and lexical assignments are important components of this class.

4012A/4012B The Structure of French: Comparisons with English: lecture 3 hours. Characteristic properties of the French language will be examined, mainly in respect of correspondences and contrasts between the French and English systems of pronunciation, writing, grammar and vocabulary. Parallel French-English excerpts from literary masterpieces will be used for observation, analysis, discussion and assignments.

4015R Cours supérieur de version/Advanced Translation into English: lecture 3 hours. Development of awareness of the expressive resources of French by dealing with problems and techniques of translation into English. The texts of weekly translation assignments, which account for 50% of the final grade, progress from expository and descriptive prose to poetry. Topics introduced through lectures and oral class reports include categories of translation, style, context and choice, context and meaning, ambiguity, verb systems of French and English, textual redundancy, simultaneous interpretation, and translation of metaphors. Occasionally, alternate English translations of a French text are studied for revealing contrasts.

4041A/4042B Cours avancé de stylistique littéraire/Advanced Composition: lecture 3 hours. These classes present an in-depth study of style. The class has as a goal to teach students to express themselves with elegance and refinement.

4300A/4301B Le roman et la poésie courtois/Courtly Novels and Poetry: lecture 3 hours. *Le Roman courtois/The Courtly Novel:* A close literary analysis of mediaeval French Arthurian romances. Texts in bilingual (Old French/French) editions. *La Poésie courtoise/Courtly Poetry:* A stylistic and socio-cultural study of French courtly love poetry from the 9th to the 15th centuries. Early texts in modern French translations.

4400A/4400B Poésie de la renaissance: Théorie et pratique/Renaissance Poetry: Theory and Practice: lecture 3 hours. A seminar-style study of poetic theories and practices from the *Rhétoriciens* to the *Pléiade* and to Malherbe. French 3400 recommended.

4401A/4401B La pensée philosophique, politique et morale de la renaissance/Philosophical, Political and Moral Thought of the Renaissance: lecture 3 hours. An in-depth study of major currents of Renaissance thought: humanism, scientific awakening, the beginning of *littérature engagée*, and the emergence of the *moralistes* and *philosophes*.

4500A/4501B L'aventure intellectuelle du grand siècle/The Intellectual Adventure of French Classicism: lecture 3 hours. The focus of these classes, which examine, at an advanced level, a major figure, movement, genre or theme in 17th-century French literature, will vary frequently. Please consult the professor for detailed information on the topic to be treated in any given semester.

4600A/4601B Le siècle des lumières: forme et philosophie/The Enlightenment: Form and Philosophy: lecture 3 hours. An in-depth study of the French Enlightenment which treats some of the longer works by major authors and introduces the student to secondary authors whose works are also of significant literary, philosophical or historical value. The study is unified by an examination of recurring philosophical ideas and literary themes important to understanding the development of new genres and styles. Please consult the professor for information on the theme treated and the works to be studied in any given semester.

4700A/4701B Du romantisme au réalisme/From Romanticism to Realism: lecture 3 hours. 4700A *La révolution romantique/The Romantic Revolution:* Romanticism is viewed primarily as a rebellious and creative force which greatly contributed to reshape traditional society. The origins, main themes and trends of the movement are studied with an attempt to show Romanticism as a European movement, the impact of which was felt in fields beyond the boundaries of literature. Classes are conducted as seminars; students are required to do a great deal of personal research, to prepare *exposés* and to participate in class discussions. The choice of texts depends largely on the students' previous experience: they include works by Mme de Staël, Chateaubriand, Lamartine, Hugo, Vigny, G. Sand and others. 4701B *Le roman/The Novel:* Intensive study of the work of a major novelist of the 19th century: e.g., Stendhal, Flaubert, Balzac, Zola; a study of his place in the development of the novel and of his contribution to the genre. The class involves a considerable amount of reading and regular reports and *exposés*.

4710A/4710B Du symbolisme au surréalisme/From Symbolism to Surrealism: lecture 3 hours. Analysis of the evolution of French literature from the various symbolist manners of Verlaine, Rimbaud, Mallarmé, Lautréamont and Laforgue, through the period of Jarry and Dada, to the aspirations and paradoxes of Surrealism viewed, principally, through the work of Breton, Eluard, Aragon and Desnos.

4800A/4801B Le théâtre et le roman modernes/Modern Theatre and Novel: lecture 3 hours. 4800A *Le théâtre de Camus et de Claudel/The Theatre of Camus and Claudel:* In all, eight plays are studied, four from each author. The works offer a contrast in philosophical content and reveal technical problems involved in their stage presentation. 4801B *Le nouveau Roman/Anti-novels of the 20th Century:* In this class we are mainly interested in fictional techniques: how the author creates his illusion. Each of the works selected for detailed study is important due to the author's rejection of conventional ideas regarding the form of the novel.

4811A/4811B La poésie francophone de Perse et Char à Senghor et Césaire/Francophone Poetry from Perse and Char to Senghor and Césaire: lecture 3 hours. Discussion of the works of five or six major fran-

ophone poets of the modern period, chosen from: Perse, Reverdy, Claudel, Char, Frénaud, Senghor, Tchicaya, Césaire, Glissant, Miron and others.

4994A/4995B, 4996A/4997B, 4998A/4999B Recherches independantes/Independent Research: May only be taken with the approval of the Chairperson as well as that of the faculty member concerned.

Graduate Level Courses

Classes in the 5000 series are for graduate students who, for more detailed information, should consult the Graduate Calendar and arrange to meet the Graduate Coordinator. Special seminars and graduate colloquia are arranged each semester. Students may obtain current information as to topics, dates, and places, in the Departmental office.

Geology

Chairperson of Department
M. Zentilli

Undergraduate Adviser
M. Gibling

Graduate Adviser
P.J.C. Ryall

Professors Emeritus
H.B.S. Cooke, MSc, DSc (Witwatersrand)
C.G.I. Friedlaender, PhD (Zurich)

Professors
D.B. Clarke, BSc, MA (Tor.), PhD (Edin.)
J.M. Hall, BSc (Wales), PhD, DIC (Lond.)
P.T. Robinson, BSc (Mich.), PhD (Calif.), Mobil Professor of Geology
P.E. Schenk, BSc (W.Ont.), MSc, PhD (Wisc.)

Adjunct Professors
J.S. Bell, BA (Oxon.), PhD (Princeton)
F. Gradstein, BA, MSc, PhD (Utrecht)
P. Hacquebard, PhD (Groningen)
L. Jansa, BSc, MSc (Masaryk), PhD (Charles)
D.J.W. Piper, BSc, PhD (Cambridge)

Associate Professors
R.A. Jamieson, BSc (Dal), PhD (MUN)
F. Medioli, PhD (Parma)
G.K. Muecke, BSc, MSc (Alta.), DPhil (Oxon.)
P.H. Reynolds, BSc (Tor.), PhD (UBC), (jointly with Physics)
P.J.C. Ryall, BSc (Dal), MSc (Alta.), PhD (Dal)
M. Zentilli, BSc (Chile), PhD (Queen's)

Assistant Professors
R. Boyd, BSc, PhD (Sydney)
M.R. Gibling, BA (Oxon.), PhD (Ottawa)

Instructor
P. Wallace, BSc, MSc (McM)

Research Associate
C. Beaumont (Major appointment in Oceanography Department)

Honorary Research Associates
P.S. Giles, BSc, MSc (Acadia), PhD (W. Ont.)
C.E. Keen, BSc, MSc (Dal), PhD (Cambridge)
C.T. Schafer, BSc, MSc, PhD (New York)

NSERC Research Fellow
D.B. Scott, BSc (Wash.), PhD (Dal)

Geology is for those who wonder about the earth. How was it made? What changes it now? Where do we seek oil? Or nickel? What moves continents? Its study is of enormous economic importance to Canada — and of course to the world as a whole — and is intellectually exciting.

The Halifax-Dartmouth region is one of the best places in Canada in which to study the earth. The departments of geology, oceanography, and physics at Dalhousie are all involved, as are several government agencies in the region.

Classes in geology are offered for different types of students. Some will want to make a career in some aspect of the study of the earth — as geologists, geochemists, geophysicists, oceanographers or teachers. Some may need instruction in geology as an aid to other disciplines: for example, a mining engineer, or a physicist interested in X-ray diffraction spectrometry, or a chemist interested in crystallography, or a biologist interested in protozoa. Students may be interested in a geology degree before they take a professional qualification such as law or business administration. Those whose prime interest is the humanities or social sciences will find that the introductory class in geology stimulates their awareness of their surroundings, and their appreciation of the many facets of science.

Careers open to geologists are many and varied. The largest number of job opportunities is provided by industry, primarily in the search for the production of raw materials. Geologists competent in mathematics might be involved in processing and analysing data using digital computers; those interested in going to sea might work with marine institutions. The federal and provincial governments also employ geologists.

High School Preparation

Students in high schools who plan a career in sciences involving the earth, such as geology or geophysics, should note that it is sensible to try to have the following subjects in Grades XI and XII: Grade XII mathematics, plus two of Chemistry, Physics and Biology. (The third should have been taken in Grade XI if possible). Note that these are *not* prerequisites, but are strongly advised. The student should aim to make up deficiencies in high school preparation in the first year at Dalhousie. Note too that at present Grade XII Geology is *not* counted as equivalent to a 1000-level class in Geology at Dalhousie.

Undergraduate Programs

Programs and classes for those whose major is not geology

These classes are specially designed for those who want to know something about the earth, but whose major field of study at Dalhousie will lie elsewhere; an economics student, concerned with resources; a history student, interested in the role played by Canada's geological frame in the development of transportation; a biology student whose fauna and flora inhabit the mud of the sea floor. These classes are:

Geology 1040A/1050B, especially designed for students in the humanities and social sciences.

There is one evening class, 2410B, open to all with 1000, or good grades in 1040A. This particular class is not normally suitable for students whose major is geology.

For engineering students and science students in other disciplines: Biologists: 1000, 2410B, 4360A, 4370B; Chemists: 1000, 2100, 3010A, 3020B, 4390B; Physicists and mathematicians: 1000, 2050B, 3130B, 4270A, 4280B, and 4290B.

General Degree Program

Three-year programs with a major in Geology are suitable for students who intend to take further professional training or to enter fields where they are likely to need their geological training as background, but are of little value as a qualification for a professional career in the earth sciences.

One program recommended for students undertaking a general BSc with a major in Geology is the first three years of the concentrated honours program (see the table below). This program may not be suitable for all students, and others can be arranged. All students intending to major in geology are required to take Geology 1000. Geology 1000 is normally also available in the first summer session. The core program for a major in geology must include Geology 2100 and 2200 and 2050B. Faculty regulations permit a student graduating with a general degree with a major in Geology to convert it to an honours degree by certificate. Note that Geology 2410B does not form a part of the core program for concentrated honours in Geology and cannot count as a credit towards an honours degree although it can form part of the General Degree Program.

Students undertaking a general degree with a major in Geology must attend an approved field school, normally the first of the two field schools offered by the department. It should normally be taken at the end of second year.

Honours degree programs

An honours degree is almost essential for any professional work in earth sciences, and for graduate study. Students must take the second and third year classes of the Geology core program listed below. The recommended program is:

Year 1: Geology 1000; Math 1000A/1000B; one class in two of Physics, Chemistry, Biology; an elective (normally selected to meet the faculty requirement for a class in which writing ability is emphasized). Note that Geology 2050B fits best in Year 2 of the program and that it has Physics 1100 and Mathematics as prerequisites. Physics and Mathematics should therefore be included in Year 1 if possible.

Year 2: Core program: Geology 2100, 2200, 2110C; one class in two of Physics, Chemistry, Biology, Mathematics; and an elective. Geology 2050B is required but students not in the geophysics stream may elect to take this class in the 3rd year.

Year 3: Core program: Geology 3010A, 3020B, 3120B, 3140A, 3160A; plus one class in Physics, Chemistry, Biology, Mathematics; and an elective. Students in the geophysics stream will take 2050B in year 2 and 3130B in year 3.

Year 4: Geology 4200; 4350B, other 4000 level classes in Geology; and an elective.

A student who decides at the end of first year to take honours in Geology but has not taken Geology 1000 in that year may take Geology 1000 in the summer session or may take 1000 and 2100 in Year 2 if he has obtained a B+ standing in Year 1. A student who has taken Geology 1000, but whose program does not meet the other requirements, should consult the department.

A student must normally complete one class in each of Biology, Chemistry, Physics, and Mathematics by the end of his second year, and a second class in one of these subjects. The recommended first classes are Physics 1100, Chemistry 110, Mathematics 1000/1010, Biology 1000 or 2000. Recommended second classes are: Biology 2000 or 3321; Chemistry 211B, 220A, 230A, 234B; Physics 2200A/2210B or 2300A/2330B; Mathematics 2000, 2200, 1060/1070, 2270B.

Students wishing to take combined honours in geology and another subject should discuss their program in detail with the undergraduate adviser. Suggestions for the first three years of study are given below.

Combined honours with Biology: Students should follow the Geology honours program in Years 1-3, including Geology 2200 and 2110C; but should take either a Biology class, or Geology 4360A/4370B in place of Geology 3010A/3020B. Suggested Biology classes are 1000 or 2000 in Year 1, 2040A/B, and 2060A/B in Year 2, and 2000 or 3321 or 3323 in Year 3.

Combined honours with Physics (a possible geophysics program): Students should follow the Geology honours program in Years 1-3, including Geology 2050B and 3130B, but should take a Physics class in place of Geology 3010A/3020B. Suggested Physics classes are 1100 in Year 1, 2300A/2330B in Year 2, and two of 2200A/2210B or 3000A/3010B or 3200A/3210B and 3160A/3170B in Year 3. Math 2000 should also be taken in either Year 2 or 3.

Combined honours with Chemistry: Students should follow the Geology honours programs in Years 1-3, but should take a 300 level Chemistry class in place of Geology 3120B and 2110C/3130B. Suggested Chemistry classes are 110 in Year 1; 220A/211B and 230A/234B or 240 in Year 2; any 300 level Chemistry in Year 3.

Students in combined honours and unconcentrated honours programs normally attend the field camp which is part of Geology 2110C whether or not they register for 2110C. This class is normally taken at the end of the second year.

Marine Geological Resources

This program is a matter of emphasis within the regular program and is designed for the students who plan to make a career in the rapidly expanding search for hydrocarbons and minerals on the Canadian continental shelves and the deep ocean. The honours thesis consists of a project in one of the marine related areas. Please consult the Geology Department for selection of courses.

Field Work

Students in a concentrated honours program must complete one field camp at the end of second year. This is an integral part of Geology 2110C. The camp runs for ten days early in May or September in cooperation with other Maritime universities. It is designed to introduce the simpler techniques used in geological mapping. A geophysics field school is held in early May and is an integral part of Geology 3130B. Field excursions are a part of several classes and are conducted at appropriate times during the session. In addition, some optional field excursions may be held each year.

Students are charged a contribution towards the cost of all field excursions. Charges for those trips that are held, during the session, as part of a class are payable at registration. Due to increased costs and uncertainty of external funding, fees for individual field excursions are fixed yearly. (Please consult department.) The charges for optional field trips are notified, and payable, several months in advance. Overpayments, in excess of \$5.00, are reimbursed to the student.

Thesis and Honours Qualifying Examination

A student in an honours degree program may choose one of three options:

A thesis as Geology 4200, followed by an oral examination, based on the general subject area of the thesis. This oral examination then counts as the honours comprehensive examination.

A thesis as Geology 4200, and a written comprehensive examination, reflecting the content of the 3000 and 4000 level classes which the student has taken.

An honours thesis in addition to five regular classes in the fourth year, in which case the thesis will count as the honours comprehensive examination.

Theses must be completed by the second Monday in March of the fourth year. Students who complete them after this date and before May 31, will have to graduate in the fall, not the spring. After May 31, the student must re-register for Geology 4200 for the following academic year, pay the fees for that class, and graduate at the spring convocation of that academic year.

Minimum Grades

Admission into the second year of the Geology program is conditional upon a minimum grade of B- in Geology 1000.

A grade of D in a later Geology class precludes admission to classes for which that one is a prerequisite.

Classes Offered

1000 Introduction to Geology: lecture 3 hours, lab 3 hours, G.K. Muecke and staff. An introductory class for students who plan to take a degree in geology, or in another science, or in engineering. The lecture material covers the whole field of geology including the origin of the solar system, earth history, mountain formation, volcanoes, continental drift, natural resources such as metals and petroleum, and environmental pollution. The laboratory component involves work with minerals, rocks, fossils, and geological maps as well as a number of field excursions to observe local geological features. Students who wish to major in Geology but have unresolvable scheduling conflicts with Geology 1000 should consult the undergraduate adviser.

1040A/1050B The Earth and Man (I & II): lecture 3 hours, lab 1 hour per week. These classes are two parts of a single unit designed for students in the social sciences and humanities. Geology 1040A deals with the nature and structure of the earth and with processes acting thereon, but only in sufficient depth to provide background for understanding of the matters discussed in Geology 1050B, without detailed study of rocks and minerals. Previous mathematics, physics, or chemistry is not required. Students with good grades in this class may enter Geology 2410B. Geology 1050B applies to geological concepts learned in 1040A to consider the influence of geological factors upon economic, social, and political decisions of the past and future. The class touches upon the geological factors involved in diverse matters, e.g., colonization by Greek city states, trade in mineral resources, and our perennial Canadian "freight rate" problem.

2050B Principles of Geophysics: lecture 3 hours, lab 1 hour, P.J.C. Ryall. Prerequisites: Physics 110 and a first year class in mathematics. Geophysical methods are increasingly important in geological studies. Understanding the principles of the various techniques (seismics, gravity, magnetics, electromagnetics), their powers, and limitations, provides a foundation for later more practical classes.

2100 Introduction to Mineralogy and Geochemistry: lecture 3 hours, lab 3 hours, D.B. Clarke. Prerequisite: Geology 1000. This class deals with the ways in which the chemical components of rocks are organized into crystalline compounds (mineralogy) and the ways in which chemical changes affect rocks (geochemistry). The lectures cover the crystallographic principles which determine the regular internal and external structure of minerals, the chemistry and structure of the major groups of rock-forming minerals, the ways in which minerals interact with melts, with other minerals and with solutions in geological environments, and practical applications of these principles to mineral exploration. The labs cover the identification and description of minerals both in hand specimen and with the use of the petrographic microscope.

2110C Field Methods: lecture 3 hours, lab 3 hours, Prerequisite: Geology 1000. This is intended as an introduction to field techniques useful to the practising geologist, particularly those concepts essential for the accurate field description and identification of rocks and the use and construction of geological maps. Geophysical field techniques and elementary structural

geology are also considered. Both the lecture and lab part of the course, held in the fall term, and the geology field school held at the end of the spring term (in Antigonish), must be completed before a final mark is awarded.

2200 Sedimentology and Biostratigraphy: lecture 3 hours, lab 3 hours, R. Boyd, M.R. Gibling, F. Medioli. Prerequisite: Geology 1000 or equivalent. The class studies the basic materials of sedimentary geology: sediments, stratified rocks and fossils. The deposits and processes seen in modern environments are related to ancient sedimentary rocks in Atlantic Canada, through field trips and lab work. Study of the fossil record places emphasis on changes through time and on the use of fossils in stratigraphy. Morphology and taxonomy are examined at an elementary level.

2410B Environmental and Resource Geology: lecture, lab 3 hours, one evening per week, G.K. Muecke. Prerequisite: any first level class in geology. Geology lies behind many of the environmental problems facing man today. In this class we consider topics such as energy and mineral resources, geological hazards such as earthquakes, landslides, and volcanic eruptions, the relevance of geology in the fields of foundation engineering, pollution and waste disposal, and the role that geology has to play in planning urban areas, especially in Nova Scotia.

3010A Igneous Petrology: lecture 3 hours, lab 3 hours, P.T. Robinson. Prerequisites: Geology 2100. The study of the field relations, mineralogy, texture, and geochemistry of volcanic and plutonic rocks. Lectures discuss the classification, graphical representation, means of production, differentiation, and emplacement of igneous rocks, and their grouping into co-magmatic provinces. Labs involve using the petrographic microscope to determine the crystallization history of igneous rocks through their mineralogy and texture.

3020B Metamorphic Petrology: lecture 3 hours, lab 3 hours, P.T. Robinson. Prerequisites: Geology 2100R, 3010A. Metamorphic petrology is the study of the way in which pre-existing igneous, sedimentary, and metamorphic rocks respond to changes in pressure, temperature, and geochemical environment. The mechanisms of metamorphic reactions and recrystallizations, the stability relations of minerals and mineral assemblages under various physical and chemical conditions, and the concept of metamorphic facies series are discussed. In the labs, microscopic mineralogy and texture are used to decipher the metamorphic history of rocks.

3120B Principles of Stratigraphy: lecture 3 hours, lab 3 hours, P.E. Schenk. Prerequisites: Geology 2200R and 3160A. Stratigraphy is concerned with the interpretation of paleogeography as recorded in layered rock. This record is a complex of three dimensional rock masses to which a fourth dimension, time, must be considered for paleographic reconstruction. Establishment of time-surfaces within this rock is essential for interpretation of complexes of depositional environments — the paleogeography. The purpose of the class is to show how rock may be attacked for such reconstruction. The first five weeks deal with stratigraphic principles and the remaining eight weeks apply them to the geologic record. Laboratory assignments involve statistical and stratigraphic map problems aided by the computer. Although statistics and machine-aids are introduced, some prior knowledge is helpful.

3130B General Geophysics: lecture 3 hours, lab 3 hours (every other week), P. Reynolds. Prerequisite: Geology 2050B. A second class in geophysics designed to follow Geology 2050B and a prerequisite for the several 4000-level geophysics classes. Topics include aspects of applied and whole earth geophysics, and physical properties of rocks.

3140A Structural Geology: lecture 3 hours, lab 3 hours, R.A. Jamieson. Prerequisites: Geology 2100R, 2200R. An introduction to the behaviour of rocks during deformation, stressing the geometrical aspects of rock structures on the scale normally encountered by the exploration geologist, and

their interpretation. The laboratory exercises in the construction and interpretation of geological maps develop skill in the interpretation and graphical representation of structures in three dimensions.

3160A Sedimentary Environments: lecture 3 hours, lab 3 hours, R. Boyd, M.R. Gibling. Prerequisite: Geology 2200. The class studies siliclastic, carbonate and evaporite sediments in the context of their environments of deposition. Alluvial areas, deserts, lakes, shallow deep seas are examined, and their distinctive features are applied to the interpretation of ancient rock sequences, especially in Atlantic Canada. The nature and shape of the sediment bodies produced in these environments are related to exploration for economic deposits of coal, petroleum and minerals in sedimentary rocks. Weekend field trips occur during September, October.

Note: At the time of printing, fourth year classes were being revised. Please consult department for courses offered. Subject to approval by the Curriculum Committee, a new class, Advanced Sedimentation, will replace Geology 4220A, 4310B, 4360A, and 4370B.

4150R Economic Geology: lecture 3 hours, lab 3 hours, M. Zentilli. Prerequisites: 3010A, 3020B, 3140A. For those interested in mineral exploration. The class starts with a brief introduction to principles of exploration and mining geology, followed by a review of the processes leading to the formation of metallic mineral deposits. Later, and developed mainly as seminars, important examples of ore deposits are discussed with emphasis on their total geological environment and the development of conceptual models for their genesis. About one third of the second term will be dedicated to the geology and petrology of coal, a self-contained course offered by Dr. P. Hacquebard (unless a special class on the geology of fossil fuels has been implemented; consult department).

4200 Honours Thesis: A research project and thesis are a normal part of the Honours BSc program and may be counted as a class under certain conditions. Special regulations govern this, and the student should consult the undergraduate adviser.

4220A Advanced Sedimentology: lecture 2 hours, lab 3 hours, P.E. Schenk. Prerequisite: Geology 2200R. Depositional and diagenetic environments of carbonates and some other authigenics are reviewed. The class consists of four parts. Part One involves demonstrations of methods unique to carbonate petrology; Part Two is on physical chemistry of carbonates; Part Three on recent humid and arid environments; Part Four on diagenesis (6 weeks). Laboratories deal with field and lab techniques, binocular logging of drill chips, and description of Schenk's collection from the Bahamas, Bermuda, Florida, Cuba, Persian Gulf and Australia. Seminars on specific topics may be planned.

4270A Applied Geophysics: lecture 3 hours, P.J.C. Ryall. Prerequisites: Geology 2050B, 3130B, or instructor's consent. The application of geophysical methods to petroleum and mineral exploration as introduced in 2050B and 3130B is here treated at a more advanced level. Assignments attempt to involve the student in interpretation of realistic geophysical data.

4280B Marine Geophysics: lecture 3 hours, lab and occasional sea trip to be arranged, P.J.C. Ryall. Prerequisites: Geology 2050B, 3130B, 4270A or instructor's consent. (Offered in 1986-87.) The application of the various geophysical techniques to the study of the sea floor and the principal results obtained are examined. The processes involved in the creation, evolution and destruction of ocean basins and the implications of the experimental observations are also considered.

4290B Advanced Solid Earth Geophysics: lecture 3 hours, C. Beaumont (Oceanography). Prerequisites: Geology 2050B, 3130B and 4270A, or Instructor's consent. Essential for geology or physics students who intend to

be geophysicists, the class covers the physical state and behaviour of the Earth as a whole. It shows how studies of geomagnetism, the Earth's electrical conductivity, earthquake seismology, the Earth's gravity field and the loss of heat from the Earth contribute to our present detailed picture of the Earth's interior. Methods of absolute age determination and other isotopic studies together with paleomagnetism allow us to follow aspects of the Earth's evolution to its present state.

4310B Marine Geology: lecture 3 hours, lab and occasional trip on small boat to be arranged, R. Boyd. Prerequisite: 3160A or instructor's permission. We study the principal techniques used by geologists working at sea, and some of the principal results obtained concerning the geology of the ocean basins.

4350B Tectonics: lecture 3 hours, R.A. Jamieson, J.M. Hall, and staff. Prerequisites: Completion of third year core courses. This is a required class for Geology Honours students. It is intended to synthesize the various aspects of geology treated in more specialized courses through an analysis of those processes which have shaped the earth's crust in the past and continue to do so today. Part of the course deals with modern plate tectonic processes as observed at active spreading centres, subduction zones, and transform faults. The rest of the course examines the structure, stratigraphy, and petrology of mountain belts like the Cordillera and the Appalachians in order to determine what processes, including plate tectonic processes, created them.

4360A Principles of Pleistocene Geology: lecture and seminar 3 hours, M.R. Gibling, D.B. Scott. Prerequisites: Geology 3160A, 3120B or instructor's consent. The special problems involved in the interpretation of Pleistocene deposits are covered. These include the origin, distribution and nature of snow and ice; movement in glaciers and ice caps; glacial stratigraphy; sea level fluctuations; ocean floor deposits; climatic changes evidenced in non-glaciated regions; theories of ice ages. Reading forms a substantial part of the class.

4370B Micropaleontology: lecture 2 hours, lab 3 hours, F. Medioli. Prerequisite: Geology 2200 or senior standing in Biology (with instructor's consent). A general systematic study of the major groups of microfossils, mainly foraminifers, ostracoda and calcareous nanno-plankton. Particular emphasis is placed on recent microfauna and on the techniques for sampling and studying them.

4380A Advanced Geochemistry: lecture 3 hours, lab 3 hours, G.K. Muecke. Prerequisites: Geology 3010A, 3020B. Geochemical aspects of ore formation and the exploration for economic mineral deposits are covered. How principles of crystal chemistry, isotope fractionation, thermodynamics, solution chemistry, etc., apply to the investigation of hydrothermal solutions, models of ore deposition and redistribution, and geochemical cycles is demonstrated. Geochemical surveys, exogenic element dispersion and the origin and evaluation of geochemical anomalies are also discussed. In the laboratory the most common methods of rock and mineral analysis and the processing of geochemical data are introduced.

4390B Advanced Igneous Petrology: lecture 3 hours, R.A. Jamieson. Prerequisites: Geology 3010A, 3020B, (offered in 1986-87). This class deals with advanced topics in igneous and metamorphic petrology. The exact content of the class varies from year to year depending on the instructor. A project involving lab work outside the scheduled lecture time is normally part of the course.

4400B Advanced Metamorphic Petrology: lecture 3 hours, R.A. Jamieson. Prerequisites: Geology 3010A, 3020B. Metamorphic rocks are considered as equilibrium systems. The role of fluids in metamorphism, metasomatism and mass transport, and kinetics of metamorphic process are discussed. Laboratory projects and special topics are chosen to suit the student's interests.

Seminars

A department seminar is held on alternate weeks. Other specialized seminars are arranged on an ad hoc basis.

Graduate Classes

Some graduate classes may be suitable. Please consult the Graduate Calendar and seek advice from the Department.

German

Chairperson of Department

Friedrich Gaede

Professors

F.W. Gaede, PhD (Freib.)

P. Michelsen, PhD (Gott.)

Associate Professors

H.G. Schwarz, MA (Munich), PhD (McG) (SABB)

D. Steffen, PhD (Gott.)

Assistant Professor

E. Spence, MA, PhD (UBC)

Lecturer

G. Josenhans

German, the most widely used language in Central Europe, is spoken by approximately 100 million people as their native tongue in Austria, the two Germanies, Switzerland and some parts of Eastern Europe. The cultural, economic, and scientific role of the German-speaking countries makes the knowledge of German indispensable to the study of most academic disciplines.

The departmental program "German Studies" is the investigation of German culture and its place in the formation of the modern world. The program concentrates on significant aspects of the cultural tradition of the German-speaking countries. From Luther to Nietzsche, Freud, and Marx, German writers have moved men and nations to change the course of the world. The literary and intellectual development of Germany culminated around 1800 in the epoch of Classicism. The authors of this epoch (Lessing, Herder, Hegel, Goethe, Schiller) founded their writings on a thorough knowledge of the cultural tradition of Europe, especially of the Greek culture. As scientists, historians, and politicians they described in their literary works, problems and questions of a universal nature. They became the first historians of literature and created the discipline of aesthetics. The universality of the authors of German classicism explains their present actuality and makes the study of German important and attractive.

Major or honours students may, with the approval of the Department of German, take up to one year (5 full credits) of work at a University in a German-speaking country and receive credit at Dalhousie.

Degree Programs

BA

Students concentrating on German should take a minimum of four German classes beyond the 100 level.

BA with Honours in German

Students considering an honours course are advised to consult the Department of German.

Combined Honours

It is possible for a student to take an honours degree combining German with another subject. Any student intending to take such a combined honours degree should consult with the two respective departments to arrange the details of such a program.

Program for Future Teachers of German

The Department also offers a special one-year program in conjunction with the Department of Education for third-year students of German. All courses under this program must be taken as a unit. Any student desiring to pursue this program should consult with the Department.

Prerequisite: Successful completion of an intermediate German Class (such as German 200) or equivalent.

Structure of Program: (a) intensive language training, (b) philology and linguistics, (c) teaching methods, and (d) work in German civilization.

Classes marked * are not offered every year. Please consult the timetable on registration to determine if this class is offered.

German Language Studies

Introductory Classes Offered

100 German for Beginners: lecture 3 hours, members of the Department. German 100 is a seminar class for beginners, and no previous knowledge is required. Its equivalent is two years of German in high school with a final mark of 75% or better. The class emphasizes the spoken language, and provides the student with a thorough knowledge of basic grammar. Language laboratory work and attendance of small conversation groups are required. The class fulfills the writing requirement for first-year students. German 100 or its equivalent is a prerequisite for all classes on the 200 level.

101 German for Beginners: lecture 3 hours, members of the Department. An introductory language class, using the same methods and goals as German 100. This class does not fulfill the writing requirement for beginning students.

105 German Reading Course for Beginners: lecture 3 hours, A. Roulston. Students acquire a knowledge of basic vocabulary and grammatical structure sufficient to understand newspapers and texts in the humanities and sciences. No previous knowledge of German is required. The class is taught in English. For purposes of admission to advanced classes in German it is equivalent to German 100.

106 German Reading Course for Beginners: lecture 3 hours, A. Roulston. An introductory reading class using the same methods and goals as German 105. This class does not fulfill the writing requirement for beginning students.

100/105 Intensified German: lecture 6 hours, lab 2 hours. The combination of German 100 and 105 is recommended to students who desire rapid progress in the German language.

***110 German Art and Literature:** lecture 3 hours, H.G. Schwarz. This class gives an introduction to modern German Art and Literature and their interrelationship. The class is taught in English.

Intermediate Classes

Intermediate classes are based on German 100, high school German Grade 10, 11, 12 or an equivalent basic knowledge.

A combination of German 200 and German 202 serves as an accelerated Intermediate German course and is designed for students who want to make rapid progress in the language.

200 Intermediate German: lecture 3 hours, G. Josenhans, H.G. Schwarz, E. Spence. The main aim is to develop a certain degree of speaking fluency as well as reading and writing skills. Language Laboratory work is required. Small conversation classes once a week as an aid to speaking fluency are compulsory.

***201 Scientific German:** lecture 3 hours, E. Spence. Prerequisite: German 100 or equivalent. Primarily a reading and translation class designed to enable science students to read scientific papers, reports, and articles in scientific journals in the original language. A reading knowledge of German is a prerequisite for many PhD degrees.

***202 Exercises in Translation and Composition:** lecture 2 hours, G. Josenhans. Prerequisite: German 100 or equivalent. English and German texts from various periods of different types will be translated. These translations lead to the discussion of specific difficulties of grammar and construction. Students must prepare translations or compositions for each class. Dictations are given once a week. The class is conducted mainly in German.

203 Advanced German: lecture 3 hours, G. Josenhans. Prerequisite: German 200 or equivalent. Readings, essays and discussions will promote fluency in the language on the advanced level.

Study of German Literature and Culture

***215 Goethe's Faust:** lecture 2 hours.

220 Introduction to German Literature: lecture 2 hours, H.G. Schwarz. A study of texts representing major periods of German Literature since the 18th century. Special emphasis is on the interaction between literature, society and the other forms of art. The class, taught in German, also serves as an introduction to literary criticism.

***230 In Pursuit of Freedom from Luther to Nietzsche:** lecture 2 hours.

***235 Germanic and Greek Mythology:** lecture 2 hours.

***245 Kant and the History of German Idealism:** seminar 2 hours, D. Steffen. A study of Kant's relation to modern Rationalism and Empiricism, and an inquiry into the principles of idealism.

***305 History and Theory of the German Novel:** seminar 2 hours, F. Gaede. Representative works from the Baroque Age to the 20th Century are studied and the principles of the genre discussed.

***310 German Literature and Thought from Reformation to Enlightenment:** lecture 2 hours, F. Gaede. A study of German literature between the 16th and 18th centuries as a direct reflection of the important religious, social and philosophical developments after the Reformation and during Absolutism.

***315 Goethe and the Enlightenment:** lecture 2 hours, D. Steffen. A study of German literature and thought of the time which preceded and witnessed the great revolutions of the 18th century.

***320 Goethe and Romanticism:** lecture 2 hours, D. Steffen. A study of Goethe, Holderlin, Kleist, and Novalis.

***324 Literature of the 19th Century:** lecture 2 hours, F. Gaede. A discussion of essential literary texts which throw a critical light on the growing forces of materialism and positivism.

***325 Modern German Literature:** lecture 2 hours, F. Gaede. A study of plays of B. Brecht and selected prose texts of Fr. Kafka, Th. Mann, and G. Grass.

***335 Hegel's Aesthetics and the Ancient:** seminar 2 hours, F. Gaede.

***340 Heidegger and German Idealism:** seminar 2 hours.

***345 Hegel's Philosophy of Nature:** seminar 2 hours.

***410 Aesthetic Theory:** seminar 2 hours, F. Gaede. A historical study of the development of literary theory.

***420 Seminar on Hegel's Phenomenology of Spirit:** 2 hours, D. Steffen. *The Phenomenology of Spirit*, published in 1807, was Hegel's first major work. He intended to write an introduction to philosophy by demonstrating the necessity of the advance from the most immediate form of knowledge to absolute knowledge. To achieve this he had to write the *Phenomenology* as an introduction to his own philosophy.

***425 Studies in German Idealism**

Graduate Studies

The department offers a graduate program leading to the MA degree.

Details of the MA program are given in the Calendar of the Faculty of Graduate Studies.

Health Education

HE4412A/B Human Sexuality: lecture and discussion 3 credit hours, E. Belzer. Prerequisite: Permission of the instructor. This class is concerned with basic knowledge and understandings regarding biomedical, psychological, historical, legal, religious, semantic and comparative cultural aspects of human sexuality from conception to senility. Consideration is given to adjustment needs and problems of children and adults in contemporary Canadian society and to educational efforts to help with them.

History

Chairperson of Department
N.G.O. Pereira

Professors

P. Burroughs, BA, PhD (Lond.), FR Hist S
M.S. Cross, BA, MA, PhD (Tor.) — Dean, Continuing Education

HISTORY

J. Fingard, BA (Dal), MPhil, PhD (Lond.)
 J.E. Flint, MA (Cantab.), PhD (Lond.), FR Hist S, FRSC
 P. Fraser, MA (Cantab.), PhD (Lond.), FR HistS
 H.S. Granter, BA (Dal), AM (Harv.)
 R.M. Haines, MA, M Litt (Durh.), DPhil (Oxon.), FR HistS, FSA
 N.G.O. Pereira, BA (Williams), MA, PhD (UC Berkeley)
 P.B. Waite, MA (UBC), PhD (Tor.), FRSC
 J.B. Webster, MA (UBC), PhD (Lond.)

Associate Professors

J.E. Crowley, AB (Princ.), MA (Mich.), PhD (Johns Hopkins)
 J. Farley, MSc (UWD), PhD (Man.), (*Biology*)
 J.F. Godfrey, BA (Tor.), B Phil, DPhil (Oxon.) — *President, King's College*
 L.D. Stokes, BA (Tor.), MA, PhD (Johns Hopkins)
 D.A. Sutherland, BA (MtA), MA (Dal), PhD (Tor.)
 G.D. Taylor, BA, PhD (Penn.)
 M. Turner, BA, MA (Manc.), PhD (Lond.)

Assistant Professors

J.T. O'Brien, BA (Wisconsin), MA, PhD (Rochester)
 D. Wootton, MA (Cantab.)
 R. Bleasdale, BA, MA, PhD (UWO)
 J.L. Parpart, BA (Brown), MA, PhD (Boston)

History as a Subject for Study at University

A sense of history is a primitive need felt by individuals and by groups. Just as people need to know who they are and how they arrived where they are, groups, races, classes, states and nations need a sense of their own past as part of their culture.

The academic study of history, therefore, is concerned to discover as much as possible of the reality of the past and to interpret human behaviour in its changes through time. It is a unique subject, scientific in the way it uses evidence, but still an art because the reconstruction of the past requires a disciplined imagination and an effective rhetoric for the communication of meaning.

The contemporary world is one of intensive specialization, in which the varieties of human knowledge have increased well beyond the capacity of any individual to command them all. These developments have reinforced the role of history as the foundation of a person's education, because history can never draw frontiers around itself to exclude any branch of human knowledge, although individual historians will want to select that portion of it especially relevant for them. History's field of study will always be the whole of human experience.

Aims of Teaching and Study

The subject of history does not have a monolithic body of knowledge. Historical understanding is a matter of interpretation, of offering explanations for and movements which are subject to constant revision by scholars. Arguments, scepticism and controversy are thus the very stuff of history. The history student does not merely acquire a particular mass of information, but learns to think independently.

Degree Programs

Classes in history are set out below. There are several levels of study. 1000-level classes are primarily for first-year students; most 2000-level classes treat broad geographical areas over specified periods; and 3000/4000 level classes provide opportunity for specialized study and advanced work for the undergraduate.

Bachelor's Degree Programs

Students who wish to major in history are urged to choose a 1000-level class and must take at least four and no more than eight upper-level

classes, of which two should be at the 3000-level. First-year students may take two 1000-level classes in history.

Students who wish to build up a greater specialization in history than the minimum requirements may do so by taking classes of an historical nature given by the Departments of Classics, Economics, Music, Philosophy, Political Science, Theatre, etc.

Interdisciplinary Programs

Mediaeval Studies Program
 African Studies Program
 Canadian Studies Program

Honours Degree Programs

Students may choose from several honours programs: European, Canadian, North American, British Imperial/African/Caribbean or General. For details consult the History Honours Coordinator.

Note: Some former full-year classes are offered as two half classes or in a half-year version. Students cannot normally take more than one version of such a class. Please consult the timetable and History Calendar Supplement for current offerings and the timing of A/B classes.

Classes Offered at the 1000 Level

1000 The Making of Modern Europe: lecture/tutorial 3 hours, R.M. Haines, D. Wootton, J.E. Crowley, N.G.O. Pereira, L.D. Stokes. An introduction to the history of Europe from the beginning of the Middle Ages to the period since the end of World War II, divided into four periods of differing chronological length: mediaeval times; the Renaissance, Reformation and early modern era; the 19th century (from the French Revolution to the outbreak of World War I); and the 20th century. The lectures, supplemented by tutorials, highlight a select number of themes and problems with which Europe has been confronted and which particularly characterized its development.

1050 The Modern World: lecture 3 hours, J.F. Godfrey, G.D. Taylor. History cannot foretell the future, but historians seek to determine the origins of the problems that confront us today, and provide a perspective for people to consider how their ancestors coped with their world. This class relates current events to broader trends of political, economic and social developments in the modern industrial world.

1200 History of Canada: lecture 3 hours, P.B. Waite. The development of Canada from Indian cultures to Pierre Trudeau. It has a central core of social and political history, but ranges across economic history as well as Canadian literature.

1300 United States History: 3 hours, staff. This class investigates the political, social and cultural development of the American colonies and the United States by addressing such fundamental matters as the coexistence of slavery with egalitarian principles, the conflict of sections over territorial expansion, the interplay of immigration with industrialization and urbanization, and the growth of the federal government's involvement in domestic and foreign affairs.

1400 Europe and the Third World: lecture/tutorial 3 hours, J.E. Flint, M. Turner, J.B. Webster. An introduction to university level work in history. This class also provides training in study habits, analysis of problems, and essay writing by examining six "units of study" in turn. The themes are announced in the Departmental Calendar Supplement. For each unit there are lectures and tutorials, and students write an essay each month in class time on each unit.

1990 Problems of Historical Study and Writing: seminar 2 hours, staff. An introduction to the problems of historical study, including the nature of historical evidence, analysis and causation. No lectures take place; instead,

each student registers for a section dealing with a type of history of interest. The sections are limited to fifteen students and meet once a week. Each student must write an essay per month. The general techniques of study and writing are thus acquired by consideration of particular problems in a field of special interest to the student. Some of the sections that may be offered: (1) The Atlantic World and the Colonization of the Americas (Crowley); (5) Problems of Historical Study and Writing: Medieval Life and Thought (Haines), 2 hours informal lecture/discussion, cross listed with Mediaeval Studies 301R; (9) Canada: Politics and Protest (Sutherland); (10) Slavery in the United States (O'Brien); and (19) The Canadian Rebellions (Burroughs).

Classes offered at the 2000 level

European History

2001A/2001B Medieval Europe: (formerly 2000) lecture/discussion 2 hours, R.M. Haines. Cross listed with Medieval Studies 311A/312B. An introduction to the thousand years between the end of the classical world and the beginnings of "modern" Europe. Where possible original sources in translation will be used to illustrate the mediaeval world-view. Students are introduced to a wide range of topics political intellectual, artistic and social, particular attention being paid to developing an appreciation of the richness of an age often characterized as dark and unknowable.

2010A Early Modern Europe's Expansion Overseas, 1500-1800: lecture/tutorial 2 hours, J.E. Crowley. The commercial and colonial expansion of Europe by sea to the Americas and the East. Topics of particular interest are the role of technology, the establishment of settler colonies, the use of unfree and indigenous labor, the effect of overseas communication on European culture, and the role of colonial expansion in the development of the world economy.

2011A Renaissance and Reformation Europe, 1450-1650: lecture/tutorial 2 hours, D. Wootton. An investigation of major changes in Western Europe from the late mediaeval depression to the crisis of centralized rule and economic growth in the seventeenth century. Among the topics are the development of humanism in fifteenth-century Italy and religious reform movements in transalpine Europe, the loss of Mediterranean predominance in European commerce, the centralization of authority by national monarchies and the rebellions lodged against them, and the subjection of urban culture and commerce to court dominance.

2012B Absolutist and Revolutionary Europe, 1650-1800: lecture/tutorial 3 hours, J.E. Crowley. Prerequisites: History 2011A or instructor's permission. A study of Western Europe during the rise of absolutist states as agencies shaping economic and social structures. The class gauges the state's effectiveness in this role against Enlightenment writings on social and economic reform. Topics include the court of Louis XIV, peasant revolts and urban popular protest, the seigneurial regime, and autocratic reform in Spain and central Europe. We focus on the characteristic sources of social conflict in France's Old Regime and their relation to the course of the Revolution.

2020 Modern Russia: lecture/tutorial 3 hours, N.G.O. Pereira. A survey of the last two centuries of modern Russia, from 1762 to the present, focussing on factors which contributed to the decline and fall of the Romanov dynasty and the formation of the Soviet state. Readings include representative samplings of contemporary opinion as well as the most recent scholarship. No prior knowledge of Russian history is presumed.

2031A Germany in the 19th Century: lecture/tutorial 2 hours, L.D. Stokes.

2032B Germany in the 20th Century: lecture/tutorial 2 hours, L.D. Stokes. Selected topics in the history of Germany during the past two centuries, including the growth of nationalism and liberalism, the role of Prussia, industrialization, Bismarck and the political parties, civil-military relations and the rise, rule and destruction of Nazism.

2040 Modern France: From the Fall of the Bastille to the Rise of De Gaulle: lecture 3 hours, J.F. Godfrey. Selected topics in French political, military, economic and cultural history from the Revolution of 1789 to the end of the Second World War.

2052B Europe and World War II: lecture/tutorial 2 hours, L.D. Stokes. Selected topics on the origins, course and aftermath of the Second World War as this involved Europe, including Nazi foreign and occupation policies, national resistance movements, the Holocaust and the wartime origins of the Cold War.

2062A Italy from the Risorgimento to Fascism, 1830-1945: lecture/tutorial 2 hours, L.D. Stokes. Selected topics in the history of 19th and 20th century Italy, including the role of Piedmont in the creation of the national state, regionalism and modernization, the political weaknesses of liberal Italy, and the origins and rule of Fascism.

British and British Imperial History

2101A Mediaeval England: lecture/tutorial 2 hours, R.M. Haines. Cross listed with Mediaeval Studies 209A. This introductory class examines some of the major political, social, and cultural themes in English history from the departure of the Roman legions to the Wars of the Roses, these may vary from year to year. At least one original source will be given detailed consideration.

2102B Early Modern England: lecture/tutorial 3 hours, D. Wootton. This class surveys the history of England from 1450 to 1750. Among the topics dealt with are the Reformation, the Government of Elizabeth I, Parliament in the early 17th century, the Civil War, the commercial revolution, and the establishment of political stability under Walpole. Note: 2101A/2102B supersedes 2100.

2110 Modern Britain: lecture/tutorial 3 hours, P. Fraser. Six themes, chosen to reveal some of the forces which have created the modern world. They are: (1) The emergence of parliamentary government from Wilkes to the Reform Act of 1832; (2) The rise of Britain to industrial preeminence from Robert Owen to the Great Exhibition of 1851; (3) The formation of the British working class from Tom Paine to the first Labour government; (4) The development of the popular press and modern modes of publicity and agitation; (5) The expansion of England and the meaning of empire in its heyday and (6) The experience of Britain in two world wars.

2130 British Empire and Commonwealth: lecture/tutorial 3 hours, P. Burroughs. Topics and themes, chosen principally in the period from the American Revolution to the present, to illustrate the character and motivation of British expansion overseas. Changing British attitudes and policies towards the empire, problems created by the contact of white settlers and indigenous populations, colonial revolts and independence movements are discussed.

2151A Scottish History 1700-1820: lecture/tutorial 3 hours, Professor D. Sutherland. The making of modern Scotland, (1700-1820). A survey of major themes in Scottish history from the Parliamentary Union with England to the end of the Napoleonic Wars. After a general introduction to Scotland, geographic and cultural inheritance, students will proceed to a review of such topics as: Anglophiles and Anglophobes; the Jacobite rebellions; commercial development and overseas expansion; Highlanders vs. Lowlanders, the Scottish Enlightenment, radicalism and repression; entrepreneurial innovation and the pursuit of progress, the Clearances and emigration to America.

2152B Scottish History 1820-Present: lecture/tutorial 3 hours, professor D.A. Sutherland.

North American History

2211A The Social History of Canada to 1870: seminar 2 hours, M.S. Cross.

2212B The Social History of Canada since 1870: seminar 2 hours, M.S. Cross. This evening session surveys the development of Canadian society from the beginnings to the present. Among the themes considered are social classes, the role of women, how people worked and how they lived, conflicts such as rioting and rebellions, and specific case studies such as Indian-white relations, the Winnipeg general strike and the troubles of industrial Cape Breton. Note: 2211A/2212B supersedes 2210.

2230 Canada in the Twentieth Century: lecture/tutorial 3 hours, R. Bleasdale, P.B. Waite. A survey of the roots of contemporary Canada, studying the origins of our current issues and problems focussing on Canadian political developments, as well as on economic and social structures, French-English relations and provincial and regional disparities.

2240 French Canada, 1837 to 1967: lecture/tutorial 3 hours, P.B. Waite. Prerequisite: It is helpful to have had a general course in Canadian History. Given in English, for English-speaking students, although French-speaking students are welcome, this class begins with the formation of French-Canadian society from 1760 to 1837. In the main deals with the development of French Canadian political and social life from 1837 to the "Quiet Revolution" of the 1960's, including both federal and provincial aspects as well as French-Canadian developments in the West, Ontario and the Maritimes. Note: also offered as 2241A/B.

2270 The Atlantic Provinces: lecture/tutorial 3 hours, D.A. Sutherland, J. Fingard. A survey of Maritime and Newfoundland history from the beginnings of European penetration to the "triumph of Canadianization." Attention is given to the interaction of environment and culture which has given rise to a durable but nevertheless vulnerable regional character. The class seeks to define internal patterns of social change and social conflict while simultaneously placing regional development within a broader national and international context.

2295B History of Modern Medicine, 1800-1950: lecture 2 hours, J. Farley. Examines the state of medicine in 1800, 1850, 1900 and 1950, and the transition of American and Canadian medicine from a low status, ineffective, poorly trained group of competing sects to what it is today. For each of these four periods the emphasis is on medical training, the diagnostic and therapeutic capabilities of physicians, their views on disease etiology, their attempts to control the size and quality of the profession and to prohibit the entry of women, and the scientific background to their views culminating in the growth of scientific medicine in the early 20th century.

2330 The United States: A Political and Economic History: seminar 2 hours, G.D. Taylor. American history features many colourful personalities and episodes from the Boston Tea Party to Watergate. Underlying these events are broad patterns of change: population movements, religious and ethnic conflict, economic development, the organization of political parties and interest groups, and unheralded but enduring shifts in the law and public opinion. This class examines public life in America from the time of Benjamin Franklin to Ronald Reagan in the context of these general processes of social, economic, and cultural development.

2340 Social History of the United States: seminar 2 hours, J.T. O'Brien. A survey of the major social and economic forces which transformed the United States from an agrarian republic to an industrial nation. Attention is drawn to the process of industrialization and such allied topics as urban growth, immigration, the rise of the corporation, the changing nature of work, and the role of government in fostering economic growth. We also look at

the history of labour organizations, protest movements, and business groups that sponsored new forms of economic activity in the period from the founding of the Republic to the Great Depression.

Third World History

2370 Age of Imperialism 1870-1970: seminar 2 hours, M. Turner. The last hundred years of the activities of the imperial powers, their impact on the world, their rivalries among themselves and the resistance they provoked on every continent. Different forms of conquest are discussed and illustrated: the shifting power balance among the imperial powers is traced and the growth of national resistance movements and their ideologies investigated. The class gives particular emphasis to the United States as the most important imperial power of the period, to its role in Latin America and to the ideologies which inform resistance movements.

2380 Latin America: Underdevelopment and Revolution: lecture/discussion 2 hours, M. Turner. Outlines key developments in Latin America from the independence wars to the present: the growth of nationalism, the impact of British and American capital and the development of the anti-imperialist struggle, (a) in relation to Argentina, Brazil and Chile, and (b) in relation to Mexico, Central America and Cuba. Note: also offered as 2381A/2382B.

2401A Precolonial Tropical Africa: lecture/tutorial 2 hours, J.L. Parpart. A study of some of the major themes of African pre-colonial history through an examination of the internal politics and development of African states and societies such as the Yoruba empire, Ashanti and Dahomey in West Africa, and states in East, Central and Southern Africa.

2402B Modern Tropical Africa: lecture/tutorial 2 hours, J.L. Parpart. A study of some of the major themes of African colonial and post-colonial history. The theme of cultural contact and its effects is prominent in considering Islamic and Christian penetration. This is followed by an examination of the impact of European colonial rule, the partition of Africa, and African responses which culminated in the emergence of independent African states.

2501A The Middle East to the First World War: lecture/tutorial 2 hours, J.E. Flint.

2502B The Middle East since the First World War: lecture/tutorial 2 hours, J.E. Flint. Prerequisites: History 2501 or permission of instructor. An introduction to the basic elements of the Islamic religion and its political aspects, the currents of change in the 19th century Turkish "modernisation," European influences in the 20th century, the development of the oil industry, the emergence of the state of Israel, Arab Nationalism, and the Iranian Islamic revolution. Note: 2501A/2502B supersedes 2500.

Classes offered at the 3000 level

European and British History

3001A/3002B Mediaeval Civilization: Sources and Literature: (formerly 3000) seminar 2 hours. Cross listed with Mediaeval Studies 315A/316B. R.M. Haines. History 2001A/2002B provides the appropriate background for this class. Each year a selection of topics is made, wide enough to be used as central themes in the context of which medieval civilization can be studied; for instance monasticism, universities, papal government, or architectural theory. Such topics are studied in depth, where possible with the help of original documents (in translation), and using periodical literature. Students master the basic work in certain areas, and are also encouraged to develop special interests of their own. Class discussions are used to unravel more difficult aspects and all students contribute in this way and in the writing of a small number of well argued and documented papers. Some general books should be read before starting the class.

3009A/3001B England in the Later Middle Ages: (formerly 3010) seminar 2 hours, R.M. Haines. Beginning with the reign of Edward II, attention is given to political, institutional, religious and social aspects of English history prior to the Tudors. This period includes the deposition of two reigning monarchs (three if Edward V is counted), the Hundred Years' War, the Black Death, Wycliffite heresy and the Lollards, the so-called "Wars of the Roses" and the most widespread building activity in the country since the Normans — despite an economic "depression." It is therefore one of exceptional interest and variety. Some previous experience of mediaeval history is desirable.

3011A/B Renaissance to Enlightenment: seminar 2 hours, D. Wootton. Prerequisites: History 2100, 2102, 2011 or 2012, or a reading ability in a Western European language other than English. This class examines selected aspects of the intellectual history of early modern Europe including history of science, historiography, political and moral philosophy and economic theory. Alongside general discussions of Renaissance, Reformation and Enlightenment, a number of authors are studied in detail, amongst them Machiavelli, Montaigne and Locke.

3012A/B The Emergence of Modern European Society, 1450-1800: seminar 2 hours, J.E. Crowley. As the first civilization to industrialize, Europe also had the most protracted transition from traditional to modern society. To study this centuries-long transition, this class examines such topics as the confrontation of peasant society with the commercialization of agriculture, the decline of magic in the face of increased literacy, the growth of specialized institutions to redress crime and insanity.

3021A/3022B The Medieval Church: seminar 2 hours, R.M. Haines. Cross listed with Medieval Studies 313A/314B. This course is offered from time to time in response to demand. It is not intended to provide a chronological survey of the development of the Western Church, but is an advanced seminar dealing with selected topics without strict chronological limits, such as monasticism, heresy, education, administration, lay-clerical conflict, church life at parish level, the work of the episcopate, ecclesiastical architecture, etc.

3030B Russian Intellectual History: seminar 2 hours, N.G.O. Pereira. A changing selection and examination of some leading examples of Russian social and political thought, including that of Belinsky, Herzen, Chernyshevsky, Tkachev, Pobedonostsev, Soloviev, Gershenzon, Trotsky, Lenin, and others.

3040 French Intellectuals in the 20th Century: seminar 2 hours, J.F. Godfrey. In France, political life and intellectual life are inseparable. This class examines the intellectual careers of Bloch, Maritain, Bernanos, Saint-Exupéry, Malraux, DeGaulle, Sartre, Camus, Teilhard de Chardin and Lévi-Strauss in the context of the political history of France in the twentieth century. Note: also offered as 3041/3042.

3051A/B Fascist and National Socialist Movements in Europe, 1900-1945: seminar 2 hours, L.D. Stokes. This class studies the origins, ideologies, social composition, leadership, rise to power and rule of the two principal European fascist and national socialist movements of the 20th century, those of Mussolini's Italy and Hitler's Germany, as well as similar phenomena which appeared in various countries of eastern and western Europe between the world wars. Through a comparative examination of these and other topics, the class attempts to define the nature of fascism and national socialism and to distinguish these from other contemporary European movements — in particular Soviet communism — with which they have often been associated as varieties of "totalitarianism."

3070 The Rise of Science: lecture/discussion 2 hours, J. Farley. For class description see Biology 3400.

3090A Aspects of Soviet Society: seminar 2 hours, N.G.O. Pereira. The basic institutions of contemporary Soviet society are considered both in terms of their own historical antecedents and useful comparisons with European counterparts. Topics may include the role of official culture, party machinery, the individual in society, relations with the West, science and technology, and the economy. Some of the assigned materials will be in Russian; therefore, a reading knowledge of Russian is required. Cross listed with Russian 309A.

3092A History: similar in format to 3090A, but often with different themes reflecting the availability of English language materials. No reading knowledge of Russian is required.

3104 Tudor and Stuart Britain: seminar 2 hours, D. Wootton. Prerequisites: History 2100 or 2102, or instructor's permission. This class concentrates on the period 1558 to 1715. Within this period the central problem tackled is that of the causes, character and consequences of the English Revolution. This involves a study of social and economic change, cultural values and intellectual assumptions, and political conciliation and conflict.

3106 The Victorian Age, England 1815 to 1870: seminar with occasional lectures, 2 hours, H.S. Granter. An examination of English society in the age of English dominance after Waterloo, before the advent of rampant imperialism in the 1870's. The seminars are planned to portray the characteristic features of the Early and mid-Victorian period. Each seminar discusses a major theme illustrating the unique character of this period in English and world history. Contemporary papers, pamphlets and other writing, including fiction, and, where possible, recent films, are used.

3110 Victorian and Edwardian England: seminar 2 hours, P. Fraser. An examination of selected aspects of political, social and intellectual history, such as the transformation of the Liberal party from Gladstone to Asquith, Labour and Socialist movements, or the ideals, theories and practices of imperialism in the palmy years of the Empire. Topics for selective study include Irish Home Rule, social theories, reform movements, electioneering, journalism, party organisation, the monarchy and the constitution, and naval and military reorganisation under the Committee of Imperial Defence.

3111 Britain in Two World Wars: seminar 2 hours, P. Fraser. Special problems of wartime Britain — political leadership, military direction, social adaptation, morale and censorship, controls and compulsion, all related to the varying fortunes of the country at war. The central figures are Asquith, Churchill and Lloyd George, Chamberlain, Churchill and Attlee. Attention is concentrated on the important episodes, both political and military or diplomatic.

3110 Edwardian England: seminar 2 hours, P. Fraser. The political, social and intellectual history of the Edwardian age. Main topics include national defence, party structures and party creeds, constitutional conflicts, and contemporary theories about society and morality.

3113A/B Britain in the Second World War: seminar 2 hours, P. Fraser. Centres on the official histories, including air power, the naval war, strategic factors, intelligence and cryptography, Anglo-U.S. relations, the scientific war, morale and war aims.

North American History

3230 Canadian Working Class History I, 1830-1914: Seminar 2 hours, R. Bleasdale. The transition to industrial capitalist society in Canada and the creation of a working class are the general themes of this course. Topics include pre-industrial work, the development of trade unions, strikes, immigration, poverty, violence, women at work, working class culture, labour in politics, and the emergence of socialism. Students write research papers

based on primary and/or secondary sources. There are no formal prerequisites but History 2230 or 2270 would be helpful.

3231 Canadian Working Class History II, The Twentieth Century Experience: seminar 2 hours, R. Bleasdale. The development of the Canadian working class movement from 1896 to the present. Topics include the degradation of work, the question of international unions, labour in politics, women and trade unions, the role of the state in industrial relations, and working class culture in mass society. Students write research papers based on primary and/or secondary sources. There are no formal prerequisites but History 2230 or 2270 would be helpful.

3240 Violence and Order in Canada, 1815-1939: tutorial 2 hours, R. Bleasdale. This class attempts to uncover the causes of violence, to analyze its types and forms, and to assess the responses of authority to different kinds of disorder. Original documents are employed as well as more conventional sources. Useful preparatory reading is Hugh Davis Graham and Ted Robert Gurr, ed., *Violence in America: Historical and Comparative Perspectives* (New York, 1969). Note: also offered as two half classes.

3250 Canada within the Empire, 1760-1914: seminar 2 hours, P. Burroughs. An examination of the political, commercial and cultural relations of Canada with Britain from conquest to nationhood, the changing attitudes of Canadians and Englishmen to the developing empire, and the interplay of imperial policies and colonial conditions.

3270 Nova Scotian Society, 1750-1945: seminar 2 hours, J. Fingard, D.A. Sutherland. Major themes in the social, economic and political evolution of provincial society are explored in an effort to identify the major forces which, since the mid 18th century, have worked to shape the Nova Scotian identity. Discussion involves both existing historical literature and original student research. No prerequisites exist but participants should have some familiarity with Canadian history.

3272 Themes in Regional History: seminar 2 hours, Professor J. Fingard, D.A. Sutherland. This class provides senior students with a chance to broaden their knowledge of historical trends in the region through archival research based on a specific theme. The theme for each session is announced in the Departmental Calendar Supplement.

3280 Disreputable Pleasures: Popular Diversions and Common Vices in Canada: lecture/tutorial 3 hours, M.S. Cross. Popular diversions tell much about the character and values of society. This class explores the significance of sports, popular music, rioting, prostitution, drinking and other pleasures. As well, it considers the response of the respectable to these activities. Topics considered include: the temperance movement and industrial discipline; religious revivals; the invention of sport; changing attitudes to prostitution; and contemporary technological diversions. Note: also offered as a half class.

3286A/B The Urban Experience in Canada: seminar 2 hours, D.A. Sutherland. The rise of the city stands as one of the most crucial changes to have taken place in our collective past. This class explores the reasons for and the impact of urbanization within Canada. Emphasis is on developments from the mid 19th century to the present.

3291A/B Wealth and Power in Canada: lecture/seminar 2 hours, G.D. Taylor. The role of business in the development and underdevelopment of Canada, and particularly the Atlantic region, is the focus of this class. Among the subjects covered are the significance of entrepreneurship in regional and national economic growth, the impact of government on business, the rise of big business and managerial organization, and the role of foreign investment in Canada.

3330 The United States, Canada and the World: seminar 2 hours, G.D. Taylor. During the past century both nations of North America evolved from sparsely settled agricultural societies to complex industrial nations with increasing influence on, and dependence upon, developments throughout the rest of the world. This class traces the rise of the United States in global political and economic affairs, and reviews the role of the United States in the transformation of Canada since the early 19th century. The class focuses on diplomatic affairs, military conflict and cooperation, the rise of multinational enterprise, and the impact of technology in shaping America's relations with Canada and the world.

3341A/B Revolutionary America, 1760-1815: seminar 2 hours, J.E. Crowley. The origins of the American revolution in colonial society and politics and the alterations of social, economic and political life resulting from the crises. Themes of particular interest are the popularization of politics, the social conflicts resulting in Loyalism, the development of a national political economy and constitutional tradition, and the cultural changes associated with republican government and egalitarian ideology.

3350A/B Family and Community in North America, 1600-1900: seminar 2 hours, J.E. Crowley. The family in North American history from the period when the family was a model for social relations to the time when it was seen as a private refuge from society at large. Among the topics considered are the role of the family in rural and urban communities; the demographic transition from high fertility and mortality; the constriction of the family's responsibilities in economic life and education; the role of ideology in shaping sex roles and childrearing; and the relations of family and community according to ethnic group, class and economic setting.

3360 Enslavement and Emancipation: Afro-Americans in the U.S. South to 1900: seminar 2 hours, J.T. O'Brien. This class examines slavery as a system of racial subordination and economic exploitation. Attention is given to the social, familial, and cultural life of the slaves, the role of slavery in shaping southern nationalism and national racial beliefs, and to reconstruction after the Civil War.

3390 Empire and Revolution in the Caribbean: seminar 2 hours, M. Turner. Caribbean wealth and Caribbean revolutions have made the islands a focus of imperial rivalries for more than three centuries. This class deals with (a) 1750-1880: the chattel slave societies created by mercantile capital and their destruction by the forces of economic and political revolution and (b) 1895 to the present: the impact of 20th century imperialism and the emergence of nationalism and socialism. Particular attention is paid to Cuba and Grenada. Note: also offered as 3391A/3392B.

African History

3440 African History from Oral Tradition: seminar 2 hours, J.B. Webster. For those students who have a keen interest in African history, the class concentrates upon a restricted geographic area and considers myths of origin, allegory and symbolism in oral traditions, how political leaders become national deities through ancestor worship and how feminist movements of the past have been handled by male chroniclers. In addition the class concentrates upon dating oral traditions through genealogies, eclipse-references, famines and cross referencing.

3450 Southern Africa since 1806: seminar 2 hours, staff. The class examines not only political changes and race relations in Southern Africa but also the effects of mining capital on rural and urban societies. The main themes considered are: the Mfecane and its effects on Southern Africa, the economic transformation of Southern Africa and its impact on political and social developments in the region, the imperial factor, the growth of African and Union Afrikaaner nationalisms and the development of apartheid, Southern Africa and the wider world.

Other classes

3610A/B Women in Capitalist Society: the North American Experience: seminar 2 hours, J. Fingard. An examination of the impact of industrialization and urbanization on "woman's sphere" in society and of the emergence of various strains of feminism in the 19th and 20th centuries. Note: also offered as 3611R.

3612A/B Women in Socialist Societies: seminar 2 hours, M. Turner. Investigates the progress made towards the achievement of equal status for women in societies dedicated in principle to equality for all. Case studies will range from Cuba to China.

3750A/B History of Seafaring: lecture/discussion 2 hours, Professor J. Fingard. An examination of our maritime heritage, with the cooperation of the staff of the Maritime Museum of the Atlantic. Within the context of these overlapping periods — the age of discovery, the age of sail, and the age of steam — the focus is on the development of merchant and naval fleets; the roles of the state, capital, and labour, and the features of seafaring culture. Special emphasis is given to the shipping industries and maritime traditions of this region.

3801A/3802B Independant Topic: staff. For students in the qualifying Year of an MA program or who have specialized interests not met by the usual classes. Qualifying Year students register with the permission of the Graduate Committee; undergraduates register with the permission of the Undergraduate Committee.

3980A/5980A Canadian Historiography: seminar 2 hours, M.S. Cross. The history of English-Canadian historical writing. Historians under consideration include Frank Underhill, Harold Innis, Donald Creighton, Arthur Lower, and W.L. Morton. Other topics include Canadian regional traditions and the development of new historical approaches. This course is primarily for MA students in Canadian history and for honour students in North American history. Others interested should see the instructor.

3990B Great Historians: D. Wootton. This is a course in historiography (the history of the writing of history). It will begin an outline of the nature and limits of ancient and mediaeval historical writing. It will then consider more closely the "modern" tradition of historical writing, beginning with the Renaissance, looking at the impact of the formation, and giving attention to Enlightenment historians such as Gibbon, Hume, Voltaire and Turgot. The course will then turn to the revolution in historical thinking carried out by Marx, and may end with an introduction to modern schools of historical writing, such as the Annales school.

4000A/B/C Directed Readings: staff. This class is open to 4th year honours students and honours certificate students only.

4010 Palaeography: seminar 2 hours, R.M. Haines. Prerequisite: Permission of the instructor. Cross listed with Mediaeval Studies 311R. This course is offered from time to time in response to demand. It provides an introduction to Latin palaeography with instruction and practice in the reading of selected manuscripts. An elementary knowledge of Latin is essential.

4990 Honours Essay: staff. All history honours students and those in combined honours courses in which history is their principal subject must write a substantial essay on a topic to be chosen in consultation with the Undergraduate Committee. The essay is related to one of their 3000 or 4000 level classes and is supervised by the appropriate staff member.

Graduate Studies

MA and PhD programs in history are offered. For details of these programs, see the Calendar of the Faculty of Graduate Studies.

Humanistic Studies in Science

Attention is drawn to the following classes, offered in several departments. All of these classes are concerned with the humanistic aspects of scientific thought and its development.

Classes marked * are not offered every year. Please consult the timetable on registration to determine if these classes are offered.

History of the Sciences

Biology 3400/Physics 3400/History 3070, Religion 3500, The Rise of Science and the Modern World: J. Farley (Biology), R. Ravindra (Physics).

*Biology 3401A, A History of the Biological Sciences: J. Farley.

History 2295A/B. The History of Modern Medicine: J. Farley.

Psychology 4580, History of Psychology: J.W. Clark.

Philosophy of the Sciences

*Philosophy 2410A, Philosophy of Psychology: T. Tomkow.

*Philosophy 2420B, Philosophy of Biology: R. Campbell.

Biology 3410B, Man in Nature: K.E. von Maltzahn.

*Religion 2351, Mystical Consciousness and Modern Science: R. Ravindra.

International Development Studies

Professors

J.H. Barkow, PhD (Sociology and Social Anthropology)

J. Flint, PhD (History)

E. Gold, PhD (Ocean Studies)

A. Hansen, PhD (Resource and Environmental Studies)

K.A. Heard, PhD (Political Science)

P.B. Huber, PhD (Economics)

L. Kasdan, PhD (Sociology and Social Anthropology)

*J.J. Mangalam, PhD (Sociology and Social Anthropology)

E. Mann Borgese, (International Ocean Affairs)

I.R. McAllister, MA (Economics)

INTERNATIONAL DEVELOPMENT

P. Ruderman, MBA (Health Administration)
 *T.M. Shaw, PhD (Political Science) (IDS Coordinator)
 C.C. Tuck, MPA (Public Administration)

Associate Professors

*R. Gamberg, MA (Education)
 *J. Kirk, PhD (Spanish) (IDS Coordinator)
 B. Lesser, PhD (Economics)
 L. Osberg, PhD (Economics)
 *M. Turner, PhD (History)

Assistant Professors

M.E. Binkley, PhD (Sociology and Social Anthropology)
 *N.W. Jabbra, PhD (Sociology and Social Anthropology) (IDS Coordinator)
 B.M. Jamieson, PhD (Economics and Public Administration)
 D.F. Luke, PhD (Political Science and Public Administration)
 B.J. Parpart, PhD (History)
 M. Welton, PhD (Education)

Changes in the international system increasingly affect us all. So in association with faculty at Saint Mary's University, Dalhousie intends to offer an interdisciplinary program in International Development Studies from September 1985 subject to MPHEC approval. This intercampus, interdisciplinary international degree program focuses on comparative examples of and explanations for change — economic, environmental, social and political — in the Third World. In its proposed major and honours degree programs it brings together a set of established Dalhousie disciplinary offerings in this growing field and combines them with three new intercampus courses — one for each year of study — in International Development Studies. These are designed to juxtapose and integrate empirical and conceptual materials drawn from several disciplinary and theoretical traditions represented in the field to provide a coherent yet diverse introduction to the contemporary world of "development." It is anticipated, subject to MPHEC approval, that DS 3000A/B will be available in 1985/6, DS 4000 in 1986/7 and DS 5000 in 1987/8.

At the time of going to press, this program is still subject to final approval by MPHEC. Students interested in it should consult with one of the three Dalhousie coordinators to ascertain its status before proceeding to plan their particular combination of courses.

Degree Programs

The Regulations for the proposed major or honours BA degree in International Development Studies require:

(1) Completion of appropriate first-year classes (one of which must be a writing class as per regulation 11.1(a)) in at least two of the major participating social sciences or humanities disciplines (i.e. Economics 1100/1120, History 1050/1400, Political Science 1101/1103, Sociology/Anthropology 1000 or 1100, or Spanish 111A and 110B).

(2) For the major, at least four and no more than eight Developmental Studies classes from the following approved list, (see regulation 11.1), of which:

two must be DS3000 and DS4000,

students must take a minimum of two classes in at least two established disciplines within Development Studies,

at least two must be at the 3000 level or above,

(3) For the honours degree, at least nine and no more than eleven Development Studies classes from the following approved list, (see regulation 11.1(b)), of which:

three must be DS3000, 4000 and 5000,

students must take a minimum of two classes in at least two established disciplines within Development Studies,

at least five must be at the 3000 level or above,

class selection must be approved by one of the program coordinators.

The International Development Studies degree at Dalhousie would be administered by a program committee (indicated by an * above) consisting of one faculty member from each major department who has a substantial teaching or research interest in the field chaired by three coordinators drawn from the humanities (Dr. John Kirk (Spanish)) and the social sciences (Dr. Timothy M. Shaw (Political Science), and Dr. Nancy Jabbra (Sociology)). All students' programs will have to be approved by one of the Dalhousie coordinators. A joint Dal-SMU Development Studies Committee will organise the joint IDS offerings.

Classes Offered**Descriptions of International Development Studies Core Courses**

DS 3000A/B Introduction to Development Studies: lecture and seminar 2 hours, T.M. Shaw and H. Veltmeier. This class will introduce students to the scope and nature of development studies. Its main emphasis will be on various theories of social change in the Third World and on the lines of research associated with these theories. Students will review the contributions that various disciplines have made to development studies and examine ways in which these complement and compete with each other in the explanation of changing conditions and societies in less developed countries.

DS 4000 Seminar in Development Studies: seminar 2 hours, staff. In this course students will begin to apply some of the theoretical perspectives and analytical tools of development studies to a selected problem of development in one particular region of the world: selected regions include Southern Africa, Tropical Africa, North Africa and the Middle East, South-East Asia, South Asia, the Caribbean and Latin America. Political and policy implications of case studies will be discussed. Presentations of student work will be preceded by presentations by faculty associated with the development studies program.

DS 5000 Honours Essay Practicum in Development Studies: seminar 2 hours, staff.

Listing of International Development Studies Approved Disciplinary Courses**African Studies**

(DS) *2000 Problems in Contemporary Africa

Economics

2238A Industrial Revolution in Europe
 2239B European Economy in Historical Perspective
 2241A/B Comparative Economic Systems
 (DS) *2250 Applied Development Economics
 (DS) *3317B Poverty and Inequality
 3300A/B International Trade
 (DS) *3333A/B Theories of Economic Development
 3334A/B Economic Development: theories and debates
 3336B Regional Development
 3432 Regional Economics
 4431A/B International Payments
 (DS) *4440 Applied Development Economics

Education

- 5981 Issues in Adult Literacy
5985R Theory and Practice of Literacy Acquisition

English

- 217 African Literature

Environmental Studies

- (DS) *5020A Resource Ecology and Economic Development

Geology

- 241B Environmental and Resource Geology

History

- 2130 British Empire and Commonwealth
(DS) *2370 Age of Imperialism
2380 Latin America: independence and after
2400A/B History of Tropical Africa
(DS) *2501A/B Middle East before/after WWI
2600 Modern East Asia
3330 The United States, Canada and the World
(DS) *3390 Empire and Revolution in the Caribbean
3450 South Africa since 1806
3612A/B Women in Socialist Society

Political Science

- 3303B Human Rights and Politics
3315B African Politics
(DS3000A) *3340A Problems of Development
3345A South Africa
2500 World Politics
2505 International Politics in the Post-War World
3531A UN in World Politics
(DS) *3535A Towards a New World Order
3540A Foreign Policies of African States
3544B Southern Africa
3590 The Politics of the Sea

Religion

- 2202 Religion and Culture in India

Sociology/Anthropology

- 2100 Ecology and Culture
2190 Sex Roles in Cross-Cultural Perspective
2230 Psychological Anthropology
2260 Culture and Political Behaviour
(DS2371) 2370 Peoples and Cultures of the World I
(DS) *2380 Peoples and Cultures of the World II
2400 Medicine and Health Across Cultures
(DS) *3060 Modernization and Development
3090 Population and Society
3210 Peasant Society and Culture

Spanish

- 207B Area Studies on Mexico and Central America
209A Women in Latin America
211A Cuban Cultural Revolution
213B Latin American Dictators
221A/B The Novel of the Mexican Revolution
223A/B Contemporary Latin American Prose
307A Contemporary Latin American History

*DS indicates proposed cross-listed courses eligible for inclusion in compulsory major and honours program.

Linguistics

Various departments offer classes in linguistics or in some aspect of linguistic study in the broad sense: French (3020 Linguistics, 3025A Linguistic Introduction to Acadian Dialectology, 4010A Great Linguists of the 20th Century, 4001 & 4002. History of the French Language, 3010 Phonetics, 4015 Advanced Translation into English, 4011B Lexicology, 4012 The Structure of French: Comparisons with English), English (201 The English Language, 202 History of the English Language, 253 Old English, 351 Middle English), Philosophy (3300B Philosophy of Language, 4510 Topics in the Philosophy of Language), Sociology and Social Anthropology (2270 Language and Culture), Psychology (3190 Psychology of Language), German (various classes), Russian (400 The Structure of Contemporary Standard Russian), Classics (several classes in Greek, Latin, Coptic, Syriac), Spanish (4040A Advanced Style and Syntax). Further information about these classes will be found under the departmental listing. It should be noted that some of the classes listed may not be offered in the current year.

Marine Biology

The Biology Department offers an Honours Degree in Marine Biology. The program is designed to provide a fundamental background in biological science while permitting concentration in marine biology. It prepares students for technical positions in marine biology and fisheries and for advanced research training in graduate school. It combines the resources of the Departments of Biology and Oceanography and other various marine-related sciences. Dalhousie is located very close to the sea coast, and these Departments are mainly in the Life Sciences Centre which has a complete flowing seawater system, the Aquatron. Other departments offer a selection of classes in economics, resource ecology and politics of the sea. The following is the suggested selection of classes:

Year I: Introductory Biology, Chemistry, Math and Physics, plus 1 Arts elective (writing class)

Year II: Ecology, Cell Biology, Marine Diversity, Ecosystems, Fish Biology, Organic Chemistry or Molecular Biology and Genetics, Statistics.

Year III: Algae, Physiology of Marine Animals, Invertebrates, Aquatic Microbiology, Genetics, electives.

Year IV: Honours thesis, Oceanography (Biological, Chemical and Physical, and Fisheries), Limnology, electives.

Suggested Electives: Resource Ecology and Economics, Marine Microbiology, Ichthyology, Coastal Ecology, Politics and Law of the Sea, Marine Geology, Physiology of Plants, Algal Physiology, Animal Nutrition, Topics in Seaweed Biology, Topics in Animal Physiology, Fish Population Biology, Field Ecology, Biology of Phytoplankton and Zooplankton, Theoretical Population Dynamics, Ecosystem Analysis. Program Coordinator, R.K. O'Dor.

Mathematics, Statistics and Computing Science

Chairperson of Department
K.A. Dunn

Professor Emeritus
M. Edelstein, MSc (Jerusalem), DSc (Technion-Haifa)

Professors

J. Borwein, MSc, DPhil (Oxford)
M.A.H. Dempster, MS, PhD (Carnegie-Mellon) (jointly with Business Administration)
C.A. Field, MSc, PhD (Northwestern) (Director of Statistics)
P.A. Fillmore, MSc, PhD (Minnesota), FRSC
R.P. Gupta, MSc (Agra), PhD (Delhi)
P. Keast, PhD (St. Andrews)
K.J.M. Moriarty, MSc (Dal), PhD (Lond.)
R. Paré, MSc, PhD (McGill)
J. Phillips, MA, PhD (Oregon)
H. Radjavi, MA, PhD (Minnesota)
W.R.S. Sutherland, MSc, PhD (Brown)
S. Swaminathan, MA, MSc, PhD (Madras)
K.K. Tan, PhD (UBC)
H.J. Thieboux, MA (Oregon), PhD (Stanford) (jointly with Community Health and Epidemiology)
A.C. Thompson, PhD (Newcastle upon Tyne)
A.J. Tingley, MA, PhD (Minnesota)

Associate Professors

A.G. Buckley, MSc (Alta.), PhD (UBC)
J.C. Clements, MA (UBC), PhD (Tor)
K.A. Dunn, MSc, PhD (Tor.)
B.W. Fawcett, MSc, PhD (McMaster)
G. Gabor, MSc, PhD (Eotvos)
J.B. Garner, MSc, PhD (Nottingham) (jointly with Community Health and Epidemiology)
L.A. Grünenfelder, PhD (ETH Zurich)
C.S. Hartzman, MS (Purdue), PhD (Colorado)
R. Rosenberg, MSc (Tor.), PhD (Michigan) (Director of Computing Science)
P.N. Stewart, MA (Berkeley), PhD (UBC)
R. Wood, MSc (McM), PhD (Dal)

Assistant Professors

P. Borwein, MSc, PhD (UBC)
A.A. Coley, PhD (Lond.)
A. Garg, PhD (Tor.)
J. Gribble, PhD (St. Andrews)
D. Hamilton, MA, PhD (Queen's)
R.D. Holmes, MSc (Princeton), PhD (Dal)

K.P. Johnson, MSc (Tor.), PhD (Brandeis)
J. Mulder, PhD (UBC)
R.J. Nowakowski, MSc, PhD (Calg.)
C.C.A. Sastri, MSc (Andhra), PhD (New York)
A. Sedgwick, PhD (Tor.)
D.P. Wiens, MSc, PhD (Calg.)

Learning Centre Director
P. Stevens, MSc, (Delft)

Computing Lab Director
R. Hody, BSc (McG)

Statistical Consulting Director
P.E. Green

Postdoctoral Fellows

K. Dilcher
P. O'Neill
B. Solel
G.A. Willis

Degree Programs

One full credit in mathematics other than Mathematics 1020 and 1100 is required for a BSc degree.

Mathematics as an area of concentration

Students who plan to major in Mathematics should arrange a program in consultation with the department.

Majors in Mathematics must obtain at least four Mathematics credits beyond the 1000 level. Amongst these, the following are required: Mathematics 2000 (or 2500 or 2200), 2030-2040 (or 2130), and at least one credit beyond the 2000 level.

The credit beyond the 2000 level may be a statistics class.

Students wishing to concentrate in Applied Mathematics, Pure Mathematics or Statistics are advised to consider modelling their programs on the first three years of the suggested Honours programs (see below), after possibly replacing 2130R with 2030A and 2040B, 2500R with 2200R or 2000R, and 3500R with 3090A and 3100B. Those students who wish to arrange interdisciplinary programs (with such fields as Physics, Chemistry, Biology, Engineering, Psychology and Economics) are invited to discuss their interests with the department.

Honours in Mathematics

The following program is normally followed by students who plan to take honours in mathematics.

Entering students who have a strong interest or background in mathematics, or who contemplate taking honours, should enroll in a special section of Math 1000 and 1010.

Year 2: Mathematics 2130 and 2500. Mathematics 2130 may be taken in Year I by well-qualified students with the consent of the instructor, in which case another class may be selected in Year II.

Year 3 and Year 4: Mathematics 3030, Mathematics 3500 and five additional classes at least two of which are numbered 4000 or above.

Students may choose programs with a concentration in Applied Mathematics, Computing Science, Pure Mathematics or Statistics. Students wishing to concentrate in Computing Science should consider Combined Honours in Mathematics and Computing Science, and examine the separate Calendar entry for Computing Science.

All honours programs must be approved by the Chairman.

Those students wishing to take an Honours degree concentrating in Applied Mathematics are advised to consider a program similar to the following:

Year 1: 1000A; 1010B; CS1400A; CS1410B; 3 elective classes.

Year 2: 2500R; 2130R; 2070A; 2080B; 2270B; (Co-op Seminar) and 1-½ elective classes.

Year 3: 3500R; 3030R; 3110A; two of 3210A, 3300A, 3260B, an appropriate statistics class; 1-½ elective classes.

Year 4: 4400; the remaining two of 3210A, 3300A, 3260B, an appropriate statistics class; one and a half other classes at 4000 level; 2 elective classes.

Those students wishing to take an Honours degree concentrating in Pure Mathematics are advised to consider a program similar to the following:

Year 1: 1000A, 1010B, CS1400A; CS1410B; 3 elective classes.

Year 2: 2500R; 2130R; another full mathematics class; 2 elective classes.

Year 3: 3500R; 3030R; another full mathematics class; 2 elective classes.

Year 4: 4010A; 4140A; three other full mathematics classes, at least one of which is at the 4000 level; 1 elective class.

It is recommended that the additional mathematics classes include a statistics class, an applied class and a class in algebra, topology or complex variables.

Honours in Statistics

The honours program in Statistics will provide students with a comprehensive knowledge of both theoretical and applied statistics and will enable students to move easily into challenging employment or graduate work in statistics.

Entering students should take Math 1000/1010 and Computing Science 1400/1410 during their first year.

The program of study for years 2, 3 and 4 is as follows:

Year 2: Statistics 2070A, 2080B; Mathematics 2030A and 2040B, or 2130R; 2000R or 2500R.

Year 3: Statistics 3360A, 3460B, 3340A, 3380B; Mathematics 3090A, 3080B or 3100B or 3110B.

Year 4: Statistics 4060R, 4620A, 4070B.

In addition 2-5 further ½ classes are required from Statistics 3370, 4080, 4100, 4350, 4390 to make up the usual 9-11 class concentration.

Honours Comprehensive Examination

The Honours Comprehensive Examination in mathematics consists of a written paper of about 20-30 pages researched and prepared by the student during the spring term. The topic is decided on in conjunction with the supervisor of the Honours seminar. The paper is also presented to the seminar. The Honours Comprehensive Examination in statistics requires successful completion of Statistics 4070.

Combined Honours

Students interested in taking honours in mathematics or statistics and another subject as a combined program should consult the chairman of the department through whom a suitable course of study can be arranged.

A combined honours program may be appropriate for many. Students

contemplating a combined honours course in mathematics or statistics and another subject should, however, bear in mind that the work in either subject would probably be insufficient for admission to a regular graduate program. A qualifying year would usually be necessary.

Co-operative Education Program

The Co-operative education program integrates the usual honours program of 8 academic terms with 4 work terms of relevant industrial/ laboratory employment. The work terms, each of 4 months duration, are spent in industrial and laboratory positions primarily in the Maritime region. The work experience helps students see the applicability of their training in mathematics, statistics and computing science and helps them make intelligent career choices. Upon successful completion of the program the student receives the Honours Degree and the University transcript indicates that the program was a cooperative one.

It is possible to complete a Co-op degree in 4 1/3 years, although students should expect to take 5 years. There is some freedom in how the work term/academic term sequences may be arranged and students should be prepared to be flexible.

There are four Co-op programs available within this Department, in the areas of:

- Mathematics,
- Mathematics and Computing Science combined,
- Computing Science
- Statistics

A Combined Honours Co-op degree, combining Mathematics or Computing Science or Statistics and another appropriate subject, is possible. Students interested in such a program should consult the Director of Co-op Education.

Eligibility

Students are required to demonstrate

sufficient academic potential;

a suitability for and interest in Co-op education;

successful completion of an appropriate combination of the classes M1000/1010 and CS1400/1410. Normally all four of the half-classes would have been completed.

Normally, students entering their second year of study may apply for admission to one of the Co-op programs. However, interested first-year students are strongly urged to contact the Director of Co-op Education as early as possible for advice on course selection.

Work Terms

It is ultimately the responsibility of the student to arrange the work term. The Program Director serves to co-ordinate the contacts between student and employer. Students are remunerated according to the employer's policies regarding permanent employees of similar training and education. At the end of each work term, each student must submit an acceptable work report.

It is important that students realize that successful completion of the work terms are an integral part of the course of study. Indeed, the advantages of Co-op Education derive directly from the successful interplay of academic knowledge and practical implementation. Consequently the work terms are central to Co-op Education.

Work terms are each of four months duration. Two consecutive work terms may be taken. Work terms are arranged subject to the student's academic preparation and the availability of suitable placements. Various combinations of work term/academic term sequences are permissible, subject to the approval of the Director of Co-op Education.

Under normal circumstances, the following criteria apply

At least 4 academic terms must be completed before the first work term is begun.

In any twelve-month period (of full-time study) at least one academic term must be completed.

The last semester in the program must be an academic term.

Co-op Seminar

This is a special seminar arranged for the benefit of Co-op students. Various topics of relevance to the work terms are discussed. The purpose of the seminar is to prepare students better for their work terms so that everyone involved in the work term — the student, the employer and the University — may benefit as much as possible.

Co-op students enrolled in their second year at Dalhousie must attend this non-credit seminar.

Academic Requirements

The academic requirements for Co-op students are similar, although not identical to, the requirements for standard Honours students. There are some differences in the courses required and the administration of the Honours Comprehensive Examination. In addition, all relevant Faculty regulations must be satisfied.

Additional Information

For additional information, course selection advice, and entry into one of the Co-op programs, contact the Director, Co-operative Education, Department of Mathematics, Statistics and Computing Science, Dalhousie University, Halifax, Nova Scotia, B3H 4H8.

First-year students who are interested in a Co-op program are urged to contact the Director before or during their first year for advice on course selection.

Mathematics Classes Offered

The listed prerequisites indicate the mathematical background expected of students entering any class but may be waived with the consent of the instructor.

Class descriptions for Computing Science can be found in the calendar under Computing Science.

Class descriptions for Statistics can be found in the calendar at the end of this section.

Credit may not be obtained twice for the same class even if the numbers have been changed.

0010R Fundamentals of Mathematics: lecture 3 hours (non-credit class). May be offered in place of senior matriculation mathematics as a prerequisite for first-year classes at the University. Normally, junior matriculation mathematics as taught in Grade XI in Nova Scotia is expected as a background but mature students or others who are well motivated are able to cope with this class. After a review of elementary algebra, functions (exponential, logarithmic and trigonometric) and analytic geometry are studied. In addition to preparing students for the calculus, the class is useful for those wishing to build up their knowledge of the fundamentals of mathematics for other reasons.

Note: The following two classes, Mathematics 1000 and Mathematics 1010, introduce the basic ideas of the calculus and together constitute a solid foundation for study in the Sciences (Physics, Chemistry, Biology, etc.), as well as for further study in Mathematics. These two half-classes are usually offered in both terms.

1000A/B Differential and Integral Calculus: lecture 3 hours, tutorial 1 hour. Prerequisite: Nova Scotia Mathematics 441 or equivalent. Credit will be given for only one of Mathematics 1000, 1100, 1120, and 1280. A self-contained introduction to differential and integral calculus. The topics

include: functions, limits, differentiation of polynomial, trigonometric, exponential and logarithmic functions, product, quotient and chain rules, applications of differentiation, antiderivatives and definite integrals, integration by substitution. A sequel to this class is Mathematics 1010.

1010A/B Differential and Integral Calculus: lecture 3 hours, tutorial 1 hour. Prerequisite: Mathematics 1000. A continuation of the study of calculus with topics including: techniques of integration, elementary differential equations and applications, Riemann sums, parametric equations and polar coordinates, sequences and series, Taylor series.

Note: Credit can be given for only one of Mathematics 1010 and 1290.

***1020R Mathematics for Liberal Arts Students:** lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. For students who wish to become acquainted with mathematics as an art rather than as a tool for the sciences. It discusses some of the more elementary yet interesting aspects of the subject with an emphasis on the historical origins of the various topics. Topics include elementary number theory, finite and infinite sets, graph theory, colouring problems, elementary topology, and topics from geometry. This class may not be used to satisfy the requirement that BSc students must have at least one full university class in mathematics.

1060A/B Introductory Statistics for Science and Health Sciences: (same as Statistics 1060A/B) lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. For description see Statistics 1060.

1070A/B Statistical Techniques of Scientific Experimentation: (same as Statistics 1070A/B) lecture 3 hours. Prerequisite: Mathematics 1060. For description see Statistics 1070.

***1080A Introductory Statistics for Pharmacy Students:** (same as Statistics 1080A) lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. For description see Statistics 1080.

1100R Mathematics for Commerce: lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. A survey of mathematical techniques useful in analyzing mathematical models in economics and management. The material covered in the class is similar to that presented in Mathematics 1000 together with an introduction to matrix algebra, the simplex method, maximization of functions of two variables and Lagrange multipliers. A survey class for students who are not going to take further work in mathematics. Students who are going to take other mathematics classes should take Mathematics 1000/1010 rather than Mathematics 1100. This class may not be used to satisfy the requirement that BSc students must have at least one full university class in mathematics.

***1120 Introductory Calculus for Pharmacy Students:** lecture 3 hours. Prerequisite: Mathematics 1080. This sequel to Mathematics 1080 is designed primarily for Pharmacy students. Calculus is introduced and computational techniques stressed. The techniques are applied to commonly occurring functions in pharmacy: namely power, exponential, logarithmic, and S-shaped functions. Basic topics include limits and continuity, the derivative, and the definite integral. At the end of the class elementary differential equations and their application to pharmacokinetics are discussed. Credit can be given for only one of Mathematics 1000, 1120.

1280A/1290B Differential and Integral Calculus for the Engineering Program: Prerequisite: Nova Scotia Mathematics 441 or equivalent. Mathematics 1280A includes a review of precalculus mathematics, functions, limits, continuity, differentiation and integration of polynomials, exponential, logarithmic and trigonometric functions. Applications to finding areas, graphing, maximum-minimum problems and related rate problems. Mathematics 1290B includes vector algebra, techniques of integration, numerical integration, lengths of curves, vectors, lines and planes in three dimensions.

surfaces of revolution, parametric equations and polar coordinates. 1280A is a prerequisite for 1290B.

2000R Intermediate Calculus: lecture 3 hours. Prerequisite: Mathematics 1010. Topics include: continuous functions and their fundamental properties, partial derivatives and applications, multiple integrals, geometry of Euclidean vector spaces with emphasis on three dimensions, elementary differential equations. Credit can not be given for more than one of Mathematics 2000, 2200, 2480-2490 and 2500.

***2020R Logic, Sets and Number Systems:** lecture 3 hours. Prerequisite: Mathematics 1010. Basic concepts from set theory and logic form the basis of this class. Symbolic logic is introduced and a working knowledge of the logical connectives, including the universal and existential quantifiers, achieved and used to make precise certain statements in mathematics. The concepts of a tautology and a proof are studied. The number systems are constructed from a Peano System and sufficient abstract algebra is introduced to make these constructions self-contained.

2030A/B Matrix Theory and Linear Algebra I: lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. This class, together with Mathematics 2040, is a self-contained introduction to Matrix Theory and Linear Algebra. Topics include: vector spaces, linear transformations, determinants, systems of linear equations. Students should note that this is a second-year class and, although it has no formal first-year prerequisites, mathematical maturity and ability to handle formal proofs at the level of a student who has completed Mathematics 1000 is expected.

2040B Matrix Theory and Linear Algebra II: lecture 3 hours. Prerequisites: Mathematics 2030 and 1000. This class is a continuation of Mathematics 2030. Topics include: similarity, diagonalization, inner product spaces. No more than one credit can be given for Mathematics 2030/2040 and 2130.

***2050R Problems in Geometry:** lecture 3 hours. Prerequisite: Mathematics 1010. This class is organized around a sequence of stimulating geometrical problems. A set of approximately 20 challenging problems is given to the students at the beginning of the year. The students are expected to attempt these problems throughout the year. Good students should be able to do some of these problems and are encouraged to present their solutions to the class for extra credit on the final grade. These problems are chosen so that their solutions use a wide variety of geometrical ideas (from Combinatorial, Projective, Inversive, Transformational, Topological, Differential and Non-Euclidean Geometry).

2070A/B Introduction to Probability and Statistics I: (same as Statistics 2070A/B) lecture 3 hours. Prerequisite: Mathematics 1000. For description see Statistics 2070.

2080B Introduction to Probability and Statistics II: lecture 3 hours. Prerequisite: Statistics 2070A and Mathematics 1010 or Mathematics 2030. Some knowledge of matrices is assumed. (Same as Statistics 2080B). For description see Statistics 2080.

2130R Linear Algebra: lecture 3 hours. Prerequisite: Mathematics 1010. For students who are interested in a broader and more basic understanding of the theory and techniques of linear algebra than is provided by 2030 and 2040. Topics include: the material of 2030 and 2040, canonical forms including the Rational Form and Jordan Form, inner product spaces including the Spectral Theorem for normal operators on finite dimensional vector spaces, linear programming and further topics in pure and applied linear algebra. This class provides an excellent background for further study in Mathematics. Not more than one credit can be given for Mathematics 2030-2040 and 2130.

***2200R Applied Intermediate Calculus:** lecture 3 hours. Prerequisite: Mathematics 1010. Designed with the needs of science and engineering students in mind. It includes the topics: functions of several variables, vector analysis, line and surface integrals, integral theorems, differential equations and series of functions of two and three variables. Credit can not be given for more than one of Mathematics 2000, 2200, 2480-2490 and 2500.

2270B Introduction to Numerical Linear Algebra: (same as Computing Science 2270B) lecture 3 hours. Prerequisites: Mathematics 1010, 2030 and Computing Science 1410 (with a grade of B-or better). For description see Computing Sciences 2270B.

2300A/B Introduction to Models of Applied Mathematics: lecture 3 hours. Prerequisite: 1010 and Computing Science 1400. An introduction to the application of mathematics in the social and life sciences. About six problems are analyzed by developing and solving mathematical models. Deterministic, axiomatic, probabilistic, and simulation models are covered. Areas from which the problems are drawn include assignment and transportation problems, measurement theory, social choice, conflict resolution, inventory management, queuing, epidemiology, and resource management.

2480A/2490B Intermediate Calculus for the Engineering Program: Prerequisite: Mathematics 1290 or 1010. The topics for these two half classes include functions of several variables, partial derivatives, multiple integrals, indeterminate forms, improper integrals, infinite series, power series, Taylor and MacLaurin series, matrices, determinants, systems of linear equations, complex numbers, elementary ordinary differential equations. Students who take Math 2480/2490 may not also receive credit for 2000 or 2200.

2500R Introductory Analysis: lecture 3 hours. Prerequisites: Good standing in Mathematics 1010 and concurrent registration in Mathematics 2130. For honours students and other serious students of mathematics. This class forms the first half of a 2-year sequence in analysis and advanced calculus; Mathematics 3500 completes the sequence. Topics include: real and complex numbers, set theory, elementary topology of Euclidean space, limits and continuity, differentiation of functions of several variables, the Riemann integral, line and surface integrals, Green's, Gauss' and Stokes' theorems, power series. Credit can not be given for more than one of Mathematics 2000, 2200, 2480-2490 and 2500.

***2540A/B Basic Set Theory:** lecture 3 hours. Prerequisite: Mathematics 1000. A simplified introduction into basic topics of set theory. Matters discussed include: sets and relations, countable and uncountable sets, cardinality in general; partial order, maximal and minimal elements, functions and operations on them; elementary topology of the real line, continuity and related topics.

***2600A/B Theory of Interest:** lecture 3 hours. Prerequisite: Mathematics 1010 or 1100. A detailed examination of the theory of simple and compound interest. The syllabus includes the material on which the theory of interest portion of Examination 4 in the Society of Actuaries examination series is based. Some of the topics are: nominal and effective rates of interest and discount, force of interest, annuities, perpetuities, price of bonds, callable bonds, special topics. This class should appeal to students in mathematics, economics and commerce. Students interested in an actuarial career should take this class and are urged to consult the department for guidance in class selection and additional information.

***2800A/B Applied Mathematics for the Life Sciences:** lecture 3 hours. Prerequisites: Mathematics 1000, Biology 1000. A preparation for the mathematical aspects of advanced courses in ecology, genetics, and physiology. Topics include: complex numbers, vector spaces, discrete mathematics and linear algebra, and differential equations. Students are introduced to each area through examples drawn from various areas of biology. Mathematics majors may not apply credit for Mathematics 2800 towards the

major requirements, although they may take Mathematics 2800 as an elective.

***3010A/B Mathematical Logic:** lecture 3 hours. Prerequisites: Mathematics 2000 and 2040. Symbolic logic is introduced first so that students who have not had any previous experience handling connectives, quantifiers and tautologies have an opportunity to practice using them. Next propositional logic is studied. This system of mathematical logic affords the opportunity of studying a formal language which is quantifier-free and so introduces, in a relatively uncomplicated setting, the background for predicate logic. The work is carried as far as Henkin's Extended Completeness Theorem.

***3020A/B Set Theory and Foundations of Analysis:** lecture 3 hours. Prerequisites: Mathematics 2000 and 2130 (or 2040). This class concerns the basic objects of mathematics and the proper way of dealing with "infinity." It is essential for a clear understanding of most modern aspects of mathematics. The topics include: operations with sets, countable and uncountable sets, cardinal numbers, ordered sets, well-ordering, ordinal numbers, the axiom of choice and its equivalents, and axiomatics in set theory.

3030R Abstract Algebra, lecture 3 hours. Prerequisite: Mathematics 2040 or 2130. In this first class in abstract algebra the following topics are treated: groups, sub-groups, factor groups, homomorphisms, rings, ideals, Euclidean domains, polynomial rings, fields, unique factorization, irreducible polynomials, Sylow theorems, solvability of polynomial equations, Galois theory, and the Jordan canonical form.

***3040A/B Metric Spaces and Elementary Topology:** lecture 3 hours. Prerequisites: Mathematics 2000 and 2130 (or 2040). Topics include: metric spaces: bounded-, totally bounded-, compact- and complete sets in metric spaces; Lipschitz and contraction mappings; topological spaces; open and closed sets, bases; continuity, compactness, connectedness.

***3050R Differential Geometry and Tensor Analysis:** lecture 3 hours. Prerequisites: Mathematics 2000 and 2130 (or 2040). The material consists of two parts. The first part discusses the theory of curves and surfaces in three-dimensional Euclidean space. Topics include: theory of curves, surfaces, first and second fundamental forms, Gaussian and mean curvature, formulae of Weingarten and Gauss, geodesic curvature and geodesics. The second part consists of an introduction to Riemannian geometry, and, if time permits, an introduction to general relativity as an application of Riemannian geometry. Topics include: foundations of tensor calculus, differentiable manifolds, foundations of Riemannian geometry, absolute differentiation and connexions.

***3070A/B Theory of Numbers:** lecture 3 hours. Prerequisite: Mathematics 2040. The following topics are discussed: congruences and residues; elementary properties of congruences; linear congruences; theorems of Fermat, Euler and Wilson; Chinese remainder theorem; quadratic residues; law of quadratic reciprocity; Legendre, Jacobi and Kronecker symbols, arithmetic functions; algebraic fields; algebraic numbers and integers; uniqueness of factorization, definition and elementary properties of ideals; ideal classes and class number.

3080A/B Introduction to Complex Variables: lecture 3 hours. Prerequisites: Mathematics 2000. An introduction to the basic elements of complex analysis. Topics include: complex numbers, functions, differentiation and integration in the complex plane, some special mappings, series in general, Taylor and Laurent Series, residues, some principles of conformal mapping theory.

3090A Advanced Calculus I: lecture 3 hours. Prerequisites: Mathematics 2000 or 2200 and 2030. An introduction to Fourier Series. Topics covered include half range expansions, expansions on other intervals, convergence theorems, differentiation and integration of Fourier Series and the Complex

form of Fourier Series. Also an introduction to special functions, including Gamma and Beta functions and orthogonal polynomials and some of their properties is given. Additional topics covered include some implicit function theorems and an introduction to transformations.

3100B Advanced Calculus II: lecture 3 hours. Prerequisite: Mathematics 3090. Topics covered include some properties of functions defined by integrals: differentiation under the integral sign, tests for convergence of improper integrals, improper multiple integrals and functions defined by improper integrals. Also considered is the Fourier integral and various other integral transforms, a review of multiple integrals and vector field theory. Green's, Stokes' and the divergence theorems and related matters are also considered. Note: Not more than one credit can be given for Mathematics 3500, 3090A, 3100B and the previous class 300.

3110A Differential Equations: lecture 3 hours. Prerequisite: Mathematics 2000. One of the aims is to give students the ability to analyze and solve a number of different types of differential equations. Wherever possible, applications are drawn from the fields of physics, chemistry, biology, and other areas. The class is intended mainly for mathematics students interested in applications and for science students who wish to be able to solve problems arising in their major areas of interest.

3120B Differential Equations: lecture 3 hours. Prerequisite: Mathematics 3110. The topics discussed are of great importance to any student interested in applied mathematics. Areas include Euclidean spaces, Fourier series, orthogonal polynomials, Sturm-Liouville problems, the classical partial differential equations, and some applications to physics, chemistry and engineering.

3210A Introduction to Numerical Analysis: (same as Computing Science 3210A, and previously part of 3200R) lecture 3 hours. Prerequisites: Mathematics 2270, 2000 (or 2200, 2500). Some more advanced aspects of numerical linear algebra, including the Power Method and the QR Algorithm are examined. Various acceleration procedures for iterative processes are examined. Several forms of interpolating polynomials, Newton, Lagrange and Hermite are considered. Finite differences are also introduced. Numerical differentiation and integration is examined. In particular, interpolatory, Gaussian, Romberg and adaptive quadrature are discussed, and error estimates considered. Polynomial splines and some of their properties are introduced. Methods for solving nonlinear equations including the Newton Raphson method are considered. Special attention is paid to finding the roots of a polynomial. Throughout, the difficulties of implementing the various methods are discussed, and illustrated via assignments. Finally, some indication of the difficulties involved in multidimensional numerical analysis is given.

***3220B Numerical Solutions of Ordinary Differential Equations, (Same as Computing Science 3220B),** lecture 3 hours. Prerequisites: Mathematics 3110, 3210, 3090 (or concurrent registration in 3500.) Initial Value Problems are considered. Various methods, including Runge-Kutta and Predictor-Corrector are examined. The convergence and stability of the numerical methods is investigated and propagated error bounds and estimates sought. Also considered are starting techniques, variable order and/or variable step length strategies and automatic error control. Systems of equations and Stiff equations are discussed. Various methods for solving Boundary Value Problems (e.g. shooting methods and collocation are also discussed). Throughout, the difficulties of implementing various methods are discussed and illustrated via assignments and the use of various computer packages. A brief introduction to the numerical solution of Partial Differential Equations may also be included.

***3230B Applied Approximation Theory:** lecture 3 hours. Prerequisites: Mathematics 3210, 3090 (or concurrent registration in 3500). A review of

orthogonal polynomials and their properties is given, and basic concepts, function norms, and orthogonal systems introduced. The best approximation to a function in the Euclidean norm is obtained. The Weierstrass Approximation Theorem is given and Runge's phenomenon discussed. We also consider characterizing the best approximation in the uniform norm and methods for obtaining this best approximation. Economization of power series is also discussed. Fourier approximation is discussed, and the Fast Fourier Transform is examined. An introduction to Rational and Padé approximation is given and these techniques are compared with polynomial approximation techniques. Throughout, the difficulties of implementing the various methods is discussed and illustrated via assignments.

***3260B Foundations of Applied Mathematics:** lecture 3 hours. Prerequisite: Mathematics 3110. This one-term class surveys some of the powerful techniques employed by the applied mathematician to handle realistic problems in an analytical fashion. Asymptotic and perturbation methods form the central theme for the class, but some time is spent on differential equation theory and also on the study of a number of successful mathematical models that illustrate the various techniques. Topics include: superposition, heat-flow, Fourier analysis, Sturm-Liouville Systems, generalized harmonic analysis, dimensional analysis and scaling, regular and singular perturbation theory, asymptotic expansions.

3300A Optimization I: lecture 3 hours. Prerequisites: Mathematics 2000, 2040. This class is an introduction to the concepts and applications of linear and nonlinear programming. Topics include the Simplex method for linear programming, duality and sensitivity analysis, convex programming, Kuhn-Tucker and Lagrange multiplier conditions, numerical algorithms for unconstrained and constrained problems. Some of these topics are illustrated by means of interactive computer packages.

3310B Optimization II: lecture 3 hours. Prerequisite: Mathematics 3300. This class continues on from the topics in 3300. Additional topics to be covered include network flow theory, graph theoretic matching problems, shortest route problems, discrete dynamic programming models, and combinatorial optimization with emphasis on integer programming problems.

***3320A/B Applied Group Theory:** lecture 3 hours. Prerequisites: Mathematics 2000, 2030. This interdisciplinary half-class is intended for third and fourth-year undergraduate and first-year graduate students in Chemistry, Mathematics and Physics. With some additional reading in Physics, it is equivalent to Physics 4480A. Topics include: review of matrices, fundamentals of groups, normal subgroups, homomorphisms, representations, character, orthogonality, symmetry groups in crystallography, role of symmetry groups in quantum physics and chemistry, normal modes and molecular vibrations.

***3330B Graph Theory and Combinatorics,** lecture 3 hours. Prerequisites: Mathematics 2000, 2040. The following topics are discussed: elements of graph theory, paths and cycles, Eulerian graphs, trees, planar graphs and the Euler polyhedral formula, Hamiltonian graphs, chromatic numbers, the five-colour theorems; items to be selected from the following topics to suit class: graphs and matrices, graphs and groups, extremal problems, and enumeration problems.

3500R Intermediate Analysis: lecture 3 hours. Prerequisites: Mathematics 2130, 2500. Mathematics 3500 continues the analysis sequence begun in Mathematics 2500. Topics include: number systems, metric spaces, compactness, continuous functions on metric spaces, Stone-Weierstrass theorem, Arzela-Ascoli theorem, sequences and series of functions and their properties, inverse and implicit function theorems, extrema, co-ordinate transformations. Credit can be given for only one of Mathematics 3090A, 3100B, 3280 and 3500.

4010A/B Introduction to Measure Theory and Integration: lecture 3 hours. Prerequisite: Mathematics 3500. A discussion of Lebesgue's theory of measure and integration on the real line. The topics include: the extended real number system and its basic properties; the definition of measurable sets, Lebesgue measure and the existence of non-measurable sets; the Lebesgue integral; differentiation of monotonic functions (e.g. the Cantor function), absolute continuity, the classical L^p spaces, Fourier series.

***4020A/B Analytic Function Theory:** lecture 3 hours. Prerequisites: Mathematics 3080 and either 3100 B or 3500. A second half-class in complex function theory. Topics include: review of analytic complex functions including topological properties of the plane, Mobius mappings, exponential, logarithmic, trigonometric and related functions, integration and the Cauchy theorem. Cauchy's integral formula, residues, harmonic functions, analytic continuation, entire and meromorphic functions, some results of conformal mapping; including the Riemann mapping theorem.

4030R Advanced Abstract Algebra: lecture 3 hours. Prerequisite: Mathematics 3030. This second class in abstract algebra deals with the structure of groups, rings, fields and modules. Topics which may be discussed include Sylow theorem, tensor products, Ext and Tor, modules over a principal ideal domain and Galois Theory.

***4050R Introduction to Algebraic Geometry:** lecture 3 hours. Prerequisite: Mathematics 3030. An introduction to the basic concepts of algebraic geometry.

***4080A/B Statistical Analysis of Spatially Coherent Systems:** lecture 3 hours. For Math majors the recommended prerequisite is Statistics 3370. For students in physical science, the natural prerequisite is Physics 4540A. (Same as Statistics 4080A/B). For description see Statistics 4080.

***4130A/B Analysis of Algorithms:** lecture 3 hours. (same as Computing Science 4130). Prerequisites: CS 3690 (with a grade of C- or better). See class description for CS 4130A/B.

***4140A/B Introduction to Functional Analysis:** lecture 3 hours. Prerequisites: Mathematics 2130 and 3040. An introduction to the basic principles of functional analysis including the following topics: infinite dimensional vector spaces, normed spaces, inner-product spaces, Banach and Hilbert spaces, linear and continuous linear functionals, the Hahn-Banach Theorem, the principle of uniform boundedness, dual spaces, weak * topology, and the Alaoglu theorem, the open mapping and closed graph theorems, and consequences and applications.

***4150A/B Functional Analysis:** lecture 3 hours. Prerequisite: Mathematics 4140. Topics include: topological vector spaces, locally convex spaces, normability, function spaces, strict convexity, uniform convexity, reflexive spaces, support functionals, geometry of convex sets and other topics.

***4160A/B Operator Theory:** lecture 3 hours. Prerequisites: Mathematics 4010 and 4140. An introduction to the theory and applications of continuous linear operators on Hilbert spaces, culminating with the spectral theorem, and including such topics as spectrum; adjoint; symmetric, self-adjoint, unitary, and normal operators; polar decomposition; differential and integral operators; C^* algebras; Gelfand Theorem; and the spectral theorem.

***4170A/B Introduction to General Topology:** lecture 3 hours. Prerequisite: Mathematics 3040. An introduction to topological spaces and includes the following topics: classification in terms of cardinality of bases, separation, etc., product spaces, Tychonoff theorem, compactness, compactifications, Tychonoff spaces, metrization.

***4180A/B Introduction to Algebraic Topology:** lecture 3 hours. Prerequisite: Mathematics 4170. An introduction to algebraic topology and including the following topics: homotopy type and the fundamental group, geometry of simplicial complexes, homology theory of complexes, chain complexes, homology groups for complexes, subdivision, induced homomorphisms, axioms for algebraic topology, singular homology, the singular complex, properties of cell complexes.

***4190A/B Differential Equations:** lecture 3 hours. Prerequisites: Mathematics 3500 (3090 and 3100) and 2030/2040 or 2130. Mathematics 3120 is recommended. Topics covered include existence and uniqueness theorems, continuity of solutions, Floquet theory, autonomous differential equations and their relation to dynamical systems and flows, periodic solutions and the Poincaré-Bendixson theorem.

***4200A/B Differential Equations - Qualitative Theory:** lecture 3 hours. Prerequisite: Mathematics 4190. Qualitative theory is concerned with what can be determined about the phase-portrait and the general behaviour of solutions of differential equations even though those solutions are not explicitly exhibited. Topics are selected from Liapunov stability theory, stable and unstable manifolds of singular points and periodic solutions, classification of plane singular points, structural stability, differential equations on manifolds and Hamiltonian systems. Various equations occurring in applications are qualitatively analysed. The precise topics and equations covered depend on the specific interests of the instructor and the students.

***4220A/B Introduction to Partial Differential Equations:** lecture 3 hours. Prerequisites: Mathematics 3110. This class is the first half of a two term sequence designed to introduce the student to the theoretical and numerical aspects of partial differential equations. Topics to be covered include: review of the theory of ordinary differential equations, classification of partial differential equations, solution of first order equations, the diffusion equation and random walk, Fourier Series and transforms, generalized functions, eigenfunction expansions.

***4230A/B Partial Differential Equations:** lecture 3 hours. Prerequisite: Mathematics 4220. This class continues the study of partial differential equations begun in 4220A. Topics to be covered include: The Rayleigh-Ritz method, Green's Functions, finite difference methods of solution, an introduction to the finite element method.

***4270A/B Numerical Software:** (same as CS 4270) lecture 3 hours. Prerequisite: CS 3210 (with a grade of C- or better). See class description for CS 4270 A/B.

***4300A/B Optimal Control Theory and Applications:** lecture 3 hours. Prerequisite: Consent of instructor. Initially the classical calculus of variations is studied and the sufficiency conditions emphasized. A constructive solution of the Euler equations is presented. Then the modern theory of optimal control is developed using techniques of mathematical programming. This approach is applied to a variety of problems such as economic growth theory, inventory control and regulator problems. Numerical methods are also presented.

***4310A/B Nonlinear Programming:** lecture 3 hours. Prerequisite: Consent of Instructor. A complete treatment of the mathematical theory which underlies the general problem of optimization of a real-valued function subject to a system of constraints. Examples and exercises of an Operations Research nature are used to illustrate the theory. The material studied in this class is a basic prerequisite for understanding and contributing to recent developments in mathematical programming.

4400A/B Modelling in Applied Mathematics: lecture 3 hours. Prerequisites: required Mathematics 3110, 3120; recommended Mathematics 3100, 3210, 3300. This course is concerned with the construction, analysis and

interpretation of mathematical models in the natural sciences with an emphasis on industrial applications. It is intended that the course will draw from and expand upon the theory developed in the prerequisites listed above. Some of the problem areas which will be explored are: discrete and continuous biological models, hydrodynamic models, wave propagation models and shocks as well as models required for the optimal control of dynamical systems.

***4660A/B Automata and Computability.** (Same as Computing Science 4660) lecture 3 hours. Prerequisites: Computer Science 1410; a 3000 level Mathematics class such as 3030. For description see Computing Science 4660.

8700 (non-credit) Co-op Seminar I

8701 (non-credit) Co-op Seminar II

8891 Co-op Work Term I

8892 Co-op Work Term II

8893 Co-op Work Term III

8894 Co-op Work Term IV

Statistics Classes Offered

Credit may not be obtained twice for the same class even if the numbers have been changed.

1060A/B Introductory Statistics for Science and Health Sciences: lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. (Same as Mathematics 1060A/B.) Through extensive use of illustrative real-life examples drawn from a wide variety of disciplines, the student is introduced to the basic concepts of statistics: data reduction, estimation, and hypothesis testing. The emphasis is on statistical concepts, rather than mathematical manipulations. The principal aim is to enable students to identify and formulate the statistical aspects of real-life problems and to become familiar with the statistical vocabulary most commonly used in scientific journals. The student requiring a more extensive exposure to the statistical methods of scientific experimentation should follow this class with Statistics 1070. Topics include descriptive statistics, elementary probability and distributions, estimation, hypothesis testing and regression. Statistics 1070 is a natural sequel for this class. Students may obtain credit for only one of Statistics 1060, 2070 and Economics 2223. Students planning to take higher level statistics classes are strongly advised to take Statistics 2070/2080 instead of 1060/1070.

1070A/B Statistical Techniques of Scientific Experimentation: lecture 3 hours. Prerequisite: Statistics 1060. (same as Mathematics 1070A/B). A continuation of 1060 including collection of techniques widely used in the experimental sciences. Topics include regression and correlation analysis, analysis of variance, and curve fitting techniques. The presentation of these topics includes consideration of the statistical aspects of experimental design. The objectives are: (1) to explain what information can be obtained from experiments through use of these techniques; (2) to explain the assumptions that must be satisfied before these techniques can be applied; (3) to illustrate the nature and methods of the necessary computations. Students may obtain credit for only one of Statistics 1060, 2070 and Economics 2222 and only one of Statistics 1070, 2080 and Economics 2223. Students planning to take higher level statistics classes are strongly urged to take Statistics 2070/2080 instead of 1060/1070.

***1080A Introductory Statistics for Pharmacy Students:** lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. (same as Mathematics 1080A). Designed primarily to fit the specifications of the College of Pharmacy. Most of the class is devoted to a study of elementary statistics

with applications to the Health Sciences. Topics include descriptive statistics, estimation, hypothesis testing, regression and analysis of variance. The last 20% of the class is intended to prepare students for Mathematics 1120B. Topics include functions and graphs, linear and quadratic equations, exponential and logarithmic functions. Credit can be given for only one of Statistics 1060, 1080.

2070A/B Introduction to Probability and Statistics I: lecture 3 hours. Prerequisite: Mathematics 1000 (same as Mathematics 2070A/B). A basic introduction to the concepts of probability and statistics. The subject matter is developed systematically with an emphasis on results of an important practical nature. The class is well suited for any student with a knowledge of calculus who wants a basic understanding of statistical procedures and tests. Topics include: descriptive statistics, counting techniques, combining elementary probabilities, normal theory estimation and inference for one and two samples, one way analysis of variance and simple linear regression. Not more than one-half credit can be given for Statistics 1060 and 2070 and Economics 2222.

2080B Introduction to Probability and Statistics II: lecture 3 hours. Prerequisites: Statistics 2070, and Mathematics 1010 or Mathematics 2030. Some knowledge of matrices is assumed. (same as Mathematics 2080). A continuation of 2070A, this class deals with commonly used data analysis techniques and related topics in probability theory and mathematical statistics. Topics include: discrete and continuous random variables, sampling distributions, central limit theorem, multiple regression analysis, analysis of variance, inference of binomial data, contingency tables. Natural sequels for this class are Statistics 3340, 3360, 3380, 3460, 4350 and 4390. Not more than one-half credit can be given for Statistics 1070 and 2080 and Economics 2223. Not more than one credit can be given for Statistics 2070/2080 and the previous class 206.

2090A Intermediate Statistics for Health Sciences: (same as Nursing 5020A) Prerequisite: Statistics 1060 or equivalent. This class is designed so that students will be able to select appropriate statistical methods to analyse categorical, ordinal and measurement data to carry out the analysis on the computer using the MINITAB and GLIM statistical languages. Topics to be covered include least squares methods and F-test in multiple regression and analysis of variance via regression, analysis of crossed and nested designs, rank methods, analysis of count or frequency data with log linear models, power of a test. This class is intended primarily for students in the Master of Nursing program and is NOT available for credit in the Faculty of Arts and Science.

3340A/B Regression and Analysis of Variance: lecture 3 hours. Prerequisites Statistics 2070/2080 and Mathematics 2030, or an equivalent knowledge of matrices. An introduction to regression with emphasis on the practical rather than the theoretical aspects. Topics include: fitting a straight line in matrix terms and fitting of general linear models, analysis of residuals, transformation of data, correlation, multiple and polynomial regression, weighted least squares, indicator variables, selecting the best regression equation, analysis of variance models and an introduction to non-linear least squares. This class makes extensive use of computer packages.

3360A/B Probability: lecture 3 hours. Prerequisites: Statistics 2070/2080 and Mathematics 2000. An introduction to the basic concepts of probability to illustrate the great variety of practical applications of probability in science and industry. Topics include: (a) Fundamentals; (b) the classical models; binomial and hypergeometric, the multinomial, the Poisson, exponential, and the uniform distributions; (c) definitions of random variables, independence, functions of random variables, and distributions of sums of independent random variables; (d) conditional events and their probabilities; their uses; (e) laws of large numbers and the Central Limit Theorem. Examples illustrating the applicability of probabilistic formulations are taken from the natural and physical sciences.

***3370A/B Stochastic Processes,** lecture 3 hours. Prerequisite: Statistics 3360. A development of concepts of: (a) Markov chains and continuous time Markov processes; (b) vector independence and the multivariate normal distribution; (c) stationary time series. Emphasis is on practical applications. The ability to translate from a physical context into the language of a probability model is stressed. This class is a natural sequel to Statistics 3360. Here, the notions of time and space indexing of probability models are introduced, and conditional probability techniques are developed to deal with models of natural phenomena.

***3380A/B Sample Survey Methods:** lecture 3 hours. Prerequisite: Statistics 2070/2080. The development of design and analysis techniques for sample surveys. Topics include simple, stratified and systematic random sampling, ratio and regression estimation, sub-sampling with units of equal and unequal size, double, multistage and multiphase sampling, non-sampling errors and non-respondents.

3460A/B Intermediate Statistical Theory: lecture 3 hours. Prerequisites: Statistics 2070, 2080 and 3360. This class provides an intermediate level coverage of statistical theory to provide a framework for valid inferences from sample data. The methods developed are based on the likelihood function and are discussed from the frequentist, likelihood, and Bayesian approaches. The problems of point estimation, interval estimation and hypothesis testing, and the related topics of sampling distributions, sufficiency, and Fisher Information are discussed.

4060R Advanced Statistical Theory: lecture 3 hours. Statistics 3360, 3460 and Mathematics 2000. This course is intended to provide a solid basis in statistical theory. The classical theory of estimation and testing provides a starting point. The Rao-Blackwell theory, Cramer-Rao bound, Neyman—Pearson theory and uniformly most powerful tests will be covered. From here, conditioning and invariance will be used to obtain good procedures in more complex situations. The theory will be developed in the context of specific problems including the general linear model. The basic ideas of robustness will be introduced followed by a discussion of goodness of fit models. The final part of the course will examine the asymptotic behaviour of a number of the statistical procedures developed in the course.

4070A/B Honours Project in Statistics: Prerequisite: successful completion of the third year Honours Statistics program. The student will carry out an independent statistical study or act as a major statistical contributor to a research project under the supervision of a faculty member. In addition the student will participate in the statistical consulting service.

***4080A/B Statistical Analysis of Spatially Coherent Systems:** (same as Mathematics 4080A/B) lecture 3 hours. For Mathematics majors the recommended prerequisite is Statistics 3370. For students in physical science, the natural prerequisite is Physics 4540. Techniques for the analysis of modelling of statistical relationships within a spatially coherent system are studied. Practical constraints in the construction of models and of estimation and prediction schemes for natural processes are illustrated with examples from weather and climate studies.

***4100A/B Statistical Decision Theory:** lecture 3 hours. Prerequisites: Statistics 3360, 3460, Mathematics 2030, and consent of instructor. Statistics may be formulated as the science of decision making under uncertainty. Decision theory applies to statistical problems the principle that a statistical procedure should be evaluated by its consequence in various circumstances. The central ideas of statistical decision making models are studied in this class: general decision problems, Bayes and minimax solution of decision problems, admissibility, invariance, sequential decision rules, testing as a decision problem, empirical Bayes rules.

***4350A/B Applied Multivariate Analysis:** lecture 3 hours. Prerequisites: Statistics 3340 and Mathematics 2130 or 2040 or 2270. The class deals with the stochastic behaviour of several variables in systems where their interdependence is the object of analysis. Greater emphasis is placed on practical application than on mathematical refinement. Topics include classification, cluster analysis, categorized data, analysis of interdependence, structural simplification by transformation or modelling and hypothesis construction and testing.

***4390A/B Time Series Analysis and Forecasting:** lecture 3 hours. Prerequisite: Statistics 3340. The analysis of univariate time series data is discussed. Topics include stationarity, transformation, differencing, autocorrelation, autoregressive-moving average models, identification, estimation, diagnostic checking and forecasting. The emphasis will be on model building using the approach of Box and Jenkins. Other topics such as exponential smoothing, seasonal adjustment and multivariate models may also be covered.

***4620A/B Data Analysis:** lecture 3 hours. Prerequisite: Statistical techniques useful as background for this class would include any techniques covered in Statistics 2070/2080, 3340, 3360 or 3460 although it is not necessary to have taken all of these prerequisites. Admission to the class is by consent of the instructor. A problem-oriented approach to statistical analysis. The problems discussed are based on real life data. Students are encouraged to develop novel approaches for data analysis problems of case studies. Some general techniques which arise in non traditional data analysis are presented in this class. Students are required to make a formal presentation of their work, which may involve data analysis of the case studies, or it may be mathematical development motivated by the case studies.

8700 (non-credit) Co-op Seminar

8701 (non-credit) Co-op Seminar

8891 Co-op Work Term I

8892 Co-op Work Term II

8893 Co-op Work Term III

8894 Co-op Work Term IV

Mediaeval Studies

The period commonly called the Middle Ages (approximately AD 400-1500) offers a unique opportunity to study Western culture as a whole. Indeed, any attempt to study a part of this period in isolation leads to a conviction that such an investigation can never be satisfying and that the walls between disciplines must be broken down and the literature seen in relation to the philosophy, the philosophy in relation to the history, and the history in relation to the languages. No matter what the vernacular tongue of any geographical area, there was one common language throughout Europe and one church, and the study of these leads inevitably to a consideration of paleography, art, architecture and music.

The field is a very large one and could become a fascinating and rewarding area for a certain type of student — the one who likes to immerse him-

self in his work and who feels that university studies need not involve storing knowledge in separate pigeon holes because his language course has nothing in common with the social science he is required to take.

The regulations for the Honours degree permit a structured program to be set up in Mediaeval Studies which cuts across traditional departmental lines while allowing considerable freedom in choice of classes.

The professors currently involved in this program are: R. Crouse, J. Doull, E. Segelberg (Classics); R. Dawson, H. Morgan (English); H. Runte (French); R. Haines (History); J. Aitchison (Political Science). A student who is interested in entering the program in Mediaeval Studies should speak to one of these faculty members, who will then refer him to the Administrative Committee for the planning of his course.

Structure

The Honours degree in Mediaeval Studies must have a major field consisting of 9 classes, selected from those with Mediaeval Studies numbers, which will include at least one in each of: a literature, history, philosophy and Latin. Other classes will depend on the individual student's interests, but all four disciplines must be represented. The minor field may be varied to suit the taste of the student: he may wish to continue into later periods in his favourite discipline or he may wish to acquire another language to help him in his work. No class in the minor field may be from the Mediaeval Studies group. The four classes not in the major field may be widely scattered: one or more of them may be 100-level prerequisites which may be necessary for later mediaeval work, e.g., introductory German or Latin.

Classes

The classes available from which a mediaeval grouping may be formed are given below. Some of them are on an *ad hoc* basis, depending on the needs of students in any given year. Staffing problems may require the omission of certain classes from time to time: students are referred to the Mediaeval Studies prospectus at the time of registration. The numbering of the classes reflects subject and department, rather than order of difficulty or of priority.

201 History of the English Language: (English 202)

202 Old English: (English 253)

203 Mediaeval Literature: (English 218)

204 Middle English: (English 351)

210 Mediaeval French Literature: (French 3300A, 3300B)

211 History of the French Language: (French 4001A, 4002B)

212 Courtly Novels and Poetry: (French 4300A, 4301B)

301 Mediaeval Life and Thought: (History 1990/5R)

304 Roman History: The Cultural History of the Roman World: (Classics 223)

307A England in the Later Middle Ages: (History 3009A)

309A Mediaeval England: (History 2101A)

310R Paleography (History 4010R)

311A/312B Mediaeval Europe: (History 2001A, 2002B)

313A/314B The Mediaeval Church: (History 3021A/3022B)

315A/316B Mediaeval Civilization: (History 3001A/3002B)

401 Mediaeval Philosophy (Classics/Philosophy 3380)

402 Latin Philosophical Texts (Latin 204)

403 Seminar on the Philosophy of the Church Fathers (Classics 440/5700)

404 Western Religious Experience (Religion 2101)

405 Religious Myths, Symbols and Rites: (Religion 2030)

Meteorology

A one-year diploma program in meteorology is available to qualified students with a general BSc degree in Physics or related subjects. For details, see under "Physics."

Microbiology

Head of Department

K.R. Rozee

Professor Emeritus

C.W. van Rooyen, DSc (Edin.), MD, ChB, FRCP, FRCP(C), FRC Path (Lond.), (Virology)

Professors

K.B. Easterbrook, PhD (ANU), (Structure and Function in Microorganisms, Bacterial Spines)

J.A. Embil, MD (Havana), PhD (Dal), FRCP(C), FACTM, Pediatrics (Clinical Virology; Herpes, Cytomegalovirus)

L.S. Kind, PhD (Yale), (Immunology, Reaginic Antibody Synthesis)

S.H.S. Lee, PhD (Dal), (Virology; Interferon)

D.E. Mahony, PhD (McG), (Bacteriology; Bacteriocins and L-Forms of Clostridia)

K.R. Rozee, PhD (Dal), Dip.Bact. (Tor.), (Viral Pathogenesis; Epidemiology)

C. Stuttard, PhD (Dublin), (Microbial Genetics)

C.E. van Rooyen, DSc (Edin.), MD, ChB, FRCP, FRCP(C), FRC Path. (Lond.), (Virology)

Associate Professors

T. Ghose, PhD (Calc.), Pathology (Immunopathology; Cancer Immunotherapy)

G.C. Johnston, PhD (York), Graduate Studies Coordinator (Genetic Control of Cell Division)

E.S. McFarlane, PhD (Dal), (Microbial Chemistry; Cancer Viruses)

D.B. Stoltz, PhD (McM), Undergraduate Studies Coordinator (Biology of Parasitic Insects; Insect Virology)

C. Stuttard, PhD (Dublin), (Microbial Genetics)

Assistant Professors

W.R. Duncan, PhD (Texas), Assoc. Prof., Surgery. (Transplantation Immunology)

T.J. Marrie, MD (Dal), FRCP(C), Assoc. Prof., Medicine (Clinical Bacteriology)

R.S. Martin, PhD (Giessen), Dip.Bact. (Lond.), Clinical Bacteriology

R. Rajaraman, PhD (Dal), (Cancer Cell Biology, Fibronectin)

Lecturer

G. Faulkner, PhD (Dal), Ultrastructure

Adjunct Professor

R.I. Carr, MD (Tor.), PhD (Rockefeller), Assoc. Prof., Medicine (Rheumatology).

The field of Microbiology includes the activities of viruses and cellular organisms such as bacteria, fungi, protozoa and algae. The Microbiology program is designed to provide the student with an understanding of microorganisms — their structure, function, diversity, and contribution to the biosphere, and attempts to provide a basic training which may serve as preparation for graduate or professional work in all fields of microbiology. The Department of Microbiology is located in the Sir Charles Tupper Medical Building and offers microbiology programs in the Faculties of Medicine, Health Professions, Arts and Science and Graduate Studies.

Degree Programs

There is no 3-year program with a Microbiology major. Students wishing to include Microbiology in other 3-year programs should take Microbiology/Biology 2100A/B, which is a prerequisite for most courses offered at Dalhousie in the disciplines of microbiology. Students interested in a major (3 year BSc) program will most likely choose Biology, and would have to complete normal core requirements in that department. Students interested in an honours program (see below) should consult the departmental advisor, preferably prior to registration for 2nd-year classes.

BSc with Honours in Microbiology

This program is recommended for students wishing to acquire the strongest possible background in the discipline of microbiology. It is particularly suited to individuals who may be interested in pursuing an academic or professional career in microbiology. The program is jointly administered by the Departments of Microbiology and Biology.

Year 1: Biology 1000, Chem 110, "Writing class," Math 1060A/1070B or 1000A/1010B, and one elective.

Year 2: Microbiology 2100A/B and an additional ½ class in microbiology*, Biology 2020A/B and 2030A/B, Biology 2110B and an additional ½ class (any subject), Chemistry 240, and one elective.

Year 3: Microbiology, two classes*, Biochem 3400B and one of Biochem 3200A or 3300B; Microbiology, one half-class*, and an additional ½ class (any subject); and one elective.

Year 4: Microbiology 4900 (Honours research and thesis); Microbiology, two classes*; and two electives.

*To be chosen from any of the courses listed below (see note 3).

based on primary and/or secondary sources. There are no formal prerequisites but History 2230 or 2270 would be helpful.

3231 Canadian Working Class History II, The Twentieth Century Experience: seminar 2 hours, R. Bleasdale. The development of the Canadian working class movement from 1896 to the present. Topics include the degradation of work, the question of international unions, labour in politics, women and trade unions, the role of the state in industrial relations, and working class culture in mass society. Students write research papers based on primary and/or secondary sources. There are no formal prerequisites but History 2230 or 2270 would be helpful.

3240 Violence and Order in Canada, 1815-1939: tutorial 2 hours, R. Bleasdale. This class attempts to uncover the causes of violence, to analyze its types and forms, and to assess the responses of authority to different kinds of disorder. Original documents are employed as well as more conventional sources. Useful preparatory reading is Hugh Davis Graham and Ted Robert Gurr, ed., *Violence in America: Historical and Comparative Perspectives* (New York, 1969). Note: also offered as two half classes.

3250 Canada within the Empire, 1760-1914: seminar 2 hours, P. Burroughs. An examination of the political, commercial and cultural relations of Canada with Britain from conquest to nationhood, the changing attitudes of Canadians and Englishmen to the developing empire, and the interplay of imperial policies and colonial conditions.

3270 Nova Scotian Society, 1750-1945: seminar 2 hours, J. Fingard, D.A. Sutherland. Major themes in the social, economic and political evolution of provincial society are explored in an effort to identify the major forces which, since the mid 18th century, have worked to shape the Nova Scotian identity. Discussion involves both existing historical literature and original student research. No prerequisites exist but participants should have some familiarity with Canadian history.

3272 Themes in Regional History: seminar 2 hours, Professor J. Fingard, D.A. Sutherland. This class provides senior students with a chance to broaden their knowledge of historical trends in the region through archival research based on a specific theme. The theme for each session is announced in the Departmental Calendar Supplement.

3280 Disreputable Pleasures: Popular Diversions and Common Vices in Canada: lecture/tutorial 3 hours, M.S. Cross. Popular diversions tell much about the character and values of society. This class explores the significance of sports, popular music, rioting, prostitution, drinking and other pleasures. As well, it considers the response of the respectable to these activities. Topics considered include: the temperance movement and industrial discipline; religious revivals; the invention of sport; changing attitudes to prostitution; and contemporary technological diversions. Note: also offered as a half class.

3286A/B The Urban Experience in Canada: seminar 2 hours, D.A. Sutherland. The rise of the city stands as one of the most crucial changes to have taken place in our collective past. This class explores the reasons for and the impact of urbanization within Canada. Emphasis is on developments from the mid 19th century to the present.

3291A/B Wealth and Power in Canada: lecture/seminar 2 hours, G.D. Taylor. The role of business in the development and underdevelopment of Canada, and particularly the Atlantic region, is the focus of this class. Among the subjects covered are the significance of entrepreneurship in regional and national economic growth, the impact of government on business, the rise of big business and managerial organization, and the role of foreign investment in Canada.

3330 The United States, Canada and the World: seminar 2 hours, G.D. Taylor. During the past century both nations of North America evolved from sparsely settled agricultural societies to complex industrial nations with increasing influence on, and dependence upon, developments throughout the rest of the world. This class traces the rise of the United States in global political and economic affairs, and reviews the role of the United States in the transformation of Canada since the early 19th century. The class focuses on diplomatic affairs, military conflict and cooperation, the rise of multinational enterprise, and the impact of technology in shaping America's relations with Canada and the world.

3341A/B Revolutionary America, 1760-1815: seminar 2 hours, J.E. Crowley. The origins of the American revolution in colonial society and politics and the alterations of social, economic and political life resulting from the crises. Themes of particular interest are the popularization of politics, the social conflicts resulting in Loyalism, the development of a national political economy and constitutional tradition, and the cultural changes associated with republican government and egalitarian ideology.

3350A/B Family and Community in North America, 1600-1900: seminar 2 hours, J.E. Crowley. The family in North American history from the period when the family was a model for social relations to the time when it was seen as a private refuge from society at large. Among the topics considered are the role of the family in rural and urban communities; the demographic transition from high fertility and mortality; the constriction of the family's responsibilities in economic life and education; the role of ideology in shaping sex roles and childrearing; and the relations of family and community according to ethnic group, class and economic setting.

3360 Enslavement and Emancipation: Afro-Americans in the U.S. South to 1900: seminar 2 hours, J.T. O'Brien. This class examines slavery as a system of racial subordination and economic exploitation. Attention is given to the social, familial, and cultural life of the slaves, the role of slavery in shaping southern nationalism and national racial beliefs, and to reconstruction after the Civil War.

3390 Empire and Revolution in the Caribbean: seminar 2 hours, M. Turner. Caribbean wealth and Caribbean revolutions have made the islands a focus of imperial rivalries for more than three centuries. This class deals with (a) 1750-1880: the chattel slave societies created by mercantile capital and their destruction by the forces of economic and political revolution and (b) 1895 to the present: the impact of 20th century imperialism and the emergence of nationalism and socialism. Particular attention is paid to Cuba and Grenada. Note: also offered as 3391A/3392B.

African History

3440 African History from Oral Tradition: seminar 2 hours, J.B. Webster. For those students who have a keen interest in African history, the class concentrates upon a restricted geographic area and considers myths of origin, allegory and symbolism in oral traditions, how political leaders become national deities through ancestor worship and how feminist movements of the past have been handled by male chroniclers. In addition the class concentrates upon dating oral traditions through genealogies, eclipse-references, famines and cross referencing.

3450 Southern Africa since 1806: seminar 2 hours, staff. The class examines not only political changes and race relations in Southern Africa but also the effects of mining capital on rural and urban societies. The main themes considered are: the Mfecane and its effects on Southern Africa, the economic transformation of Southern Africa and its impact on political and social developments in the region, the imperial factor, the growth of African and Union Afrikaaner nationalisms and the development of apartheid, Southern Africa and the wider world.

Other classes

3610A/B Women in Capitalist Society: the North American Experience: seminar 2 hours, J. Fingard. An examination of the impact of industrialization and urbanization on "woman's sphere" in society and of the emergence of various strains of feminism in the 19th and 20th centuries. Note: also offered as 3611R.

3612A/B Women in Socialist Societies: seminar 2 hours, M. Turner. Investigates the progress made towards the achievement of equal status for women in societies dedicated in principle to equality for all. Case studies will range from Cuba to China.

3750A/B History of Seafaring: lecture/discussion 2 hours, Professor J. Fingard. An examination of our maritime heritage, with the cooperation of the staff of the Maritime Museum of the Atlantic. Within the context of these overlapping periods — the age of discovery, the age of sail, and the age of steam — the focus is on the development of merchant and naval fleets; the roles of the state, capital, and labour, and the features of seafaring culture. Special emphasis is given to the shipping industries and maritime traditions of this region.

3801A/3802B Independant Topic: staff. For students in the qualifying Year of an MA program or who have specialized interests not met by the usual classes. Qualifying Year students register with the permission of the Graduate Committee; undergraduates register with the permission of the Undergraduate Committee.

3980A/5980A Canadian Historiography: seminar 2 hours, M.S. Cross. The history of English-Canadian historical writing. Historians under consideration include Frank Underhill, Harold Innis, Donald Creighton, Arthur Lower, and W.L. Morton. Other topics include Canadian regional traditions and the development of new historical approaches. This course is primarily for MA students in Canadian history and for honour students in North American history. Others interested should see the instructor.

3990B Great Historians: D. Wootton. This is a course in historiography (the history of the writing of history). It will begin an outline of the nature and limits of ancient and mediaeval historical writing. It will then consider more closely the "modern" tradition of historical writing, beginning with the Renaissance, looking at the impact of the formation, and giving attention to Enlightenment historians such as Gibbon, Hume, Voltaire and Turgot. The course will then turn to the revolution in historical thinking carried out by Marx, and may end with an introduction to modern schools of historical writing, such as the Annales school.

4000A/B/C Directed Readings: staff. This class is open to 4th year honours students and honours certificate students only.

4010 Palaeography: seminar 2 hours, R.M. Haines. Prerequisite: Permission of the instructor. Cross listed with Mediaeval Studies 311R. This course is offered from time to time in response to demand. It provides an introduction to Latin palaeography with instruction and practice in the reading of selected manuscripts. An elementary knowledge of Latin is essential.

4990 Honours Essay: staff. All history honours students and those in combined honours courses in which history is their principal subject must write a substantial essay on a topic to be chosen in consultation with the Undergraduate Committee. The essay is related to one of their 3000 or 4000 level classes and is supervised by the appropriate staff member.

Graduate Studies

MA and PhD programs in history are offered. For details of these programs, see the Calendar of the Faculty of Graduate Studies.

Humanistic Studies in Science

Attention is drawn to the following classes, offered in several departments. All of these classes are concerned with the humanistic aspects of scientific thought and its development.

Classes marked * are not offered every year. Please consult the timetable on registration to determine if these classes are offered.

History of the Sciences

Biology 3400/Physics 3400/History 3070, Religion 3500, The Rise of Science and the Modern World: J. Farley (Biology), R. Ravindra (Physics).

*Biology 3401A, A History of the Biological Sciences: J. Farley.

History 2295A/B. The History of Modern Medicine: J. Farley.

Psychology 4580, History of Psychology: J.W. Clark.

Philosophy of the Sciences

*Philosophy 2410A, Philosophy of Psychology: T. Tomkow.

*Philosophy 2420B, Philosophy of Biology: R. Campbell.

Biology 3410B, Man in Nature: K.E. von Maltzahn.

*Religion 2351, Mystical Consciousness and Modern Science: R. Ravindra.

International Development Studies

Professors

J.H. Barkow, PhD (Sociology and Social Anthropology)

J. Flint, PhD (History)

E. Gold, PhD (Ocean Studies)

A. Hansen, PhD (Resource and Environmental Studies)

K.A. Heard, PhD (Political Science)

P.B. Huber, PhD (Economics)

L. Kasdan, PhD (Sociology and Social Anthropology)

*J.J. Mangalam, PhD (Sociology and Social Anthropology)

E. Mann Borgese, (International Ocean Affairs)

I.R. McAllister, MA (Economics)

P. Ruderman, MBA (Health Administration)
 *T.M. Shaw, PhD (Political Science) (IDS Coordinator)
 C.C. Tuck, MPA (Public Administration)

Associate Professors

*R. Gamberg, MA (Education)
 *J. Kirk, PhD (Spanish) (IDS Coordinator)
 B. Lesser, PhD (Economics)
 L. Osberg, PhD (Economics)
 *M. Turner, PhD (History)

Assistant Professors

M.E. Binkley, PhD (Sociology and Social Anthropology)
 *N.W. Jabbra, PhD (Sociology and Social Anthropology) (IDS Coordinator)
 B.M. Jamieson, PhD (Economics and Public Administration)
 D.F. Luke, PhD (Political Science and Public Administration)
 B.J. Parpart, PhD (History)
 M. Welton, PhD (Education)

Changes in the international system increasingly affect us all. So in association with faculty at Saint Mary's University, Dalhousie intends to offer an interdisciplinary program in International Development Studies from September 1985 subject to MPHEC approval. This intercampus, interdisciplinary international degree program focuses on comparative examples of and explanations for change — economic, environmental, social and political — in the Third World. In its proposed major and honours degree programs it brings together a set of established Dalhousie disciplinary offerings in this growing field and combines them with three new intercampus courses — one for each year of study — in International Development Studies. These are designed to juxtapose and integrate empirical and conceptual materials drawn from several disciplinary and theoretical traditions represented in the field to provide a coherent yet diverse introduction to the contemporary world of "development." It is anticipated, subject to MPHEC approval, that DS 3000A/B will be available in 1985/6, DS 4000 in 1986/7 and DS 5000 in 1987/8.

At the time of going to press, this program is still subject to final approval by MPHEC. Students interested in it should consult with one of the three Dalhousie coordinators to ascertain its status before proceeding to plan their particular combination of courses.

Degree Programs

The Regulations for the proposed major or honours BA degree in International Development Studies require:

(1) Completion of appropriate first-year classes (one of which must be a writing class as per regulation 11.1(a)) in at least two of the major participating social sciences or humanities disciplines (i.e. Economics 1100/1120, History 1050/1400, Political Science 1101/1103, Sociology/Anthropology 1000 or 1100, or Spanish 111A and 110B).

(2) For the major, at least four and no more than eight Developmental Studies classes from the following approved list, (see regulation 11.1), of which:

two must be DS3000 and DS4000,

students must take a minimum of two classes in at least two established disciplines within Development Studies,

at least two must be at the 3000 level or above,

(3) For the honours degree, at least nine and no more than eleven Development Studies classes from the following approved list, (see regulation 11.1(b)), of which:

three must be DS3000, 4000 and 5000,

students must take a minimum of two classes in at least two established disciplines within Development Studies,

at least five must be at the 3000 level or above,

class selection must be approved by one of the program coordinators.

The International Development Studies degree at Dalhousie would be administered by a program committee (indicated by an * above) consisting of one faculty member from each major department who has a substantial teaching or research interest in the field chaired by three coordinators drawn from the humanities (Dr. John Kirk (Spanish)) and the social sciences (Dr. Timothy M. Shaw (Political Science), and Dr. Nancy Jabbra (Sociology)). All students' programs will have to be approved by one of the Dalhousie coordinators. A joint Dal-SMU Development Studies Committee will organise the joint IDS offerings.

Classes Offered

Descriptions of International Development Studies Core Courses

DS 3000A/B Introduction to Development Studies: lecture and seminar 2 hours, T.M. Shaw and H. Veltmeier. This class will introduce students to the scope and nature of development studies. Its main emphasis will be on various theories of social change in the Third World and on the lines of research associated with these theories. Students will review the contributions that various disciplines have made to development studies and examine ways in which these complement and compete with each other in the explanation of changing conditions and societies in less developed countries.

DS 4000 Seminar in Development Studies: seminar 2 hours, staff. In this course students will begin to apply some of the theoretical perspectives and analytical tools of development studies to a selected problem of development in one particular region of the world: selected regions include Southern Africa, Tropical Africa, North Africa and the Middle East, South-East Asia, South Asia, the Caribbean and Latin America. Political and policy implications of case studies will be discussed. Presentations of student work will be preceded by presentations by faculty associated with the development studies program.

DS 5000 Honours Essay Practicum in Development Studies: seminar 2 hours, staff.

Listing of International Development Studies Approved Disciplinary Courses

African Studies

(DS) *2000 Problems in Contemporary Africa

Economics

2238A Industrial Revolution in Europe

2239B European Economy in Historical Perspective

2241A/B Comparative Economic Systems

(DS) *2250 Applied Development Economics

(DS) *3317B Poverty and Inequality

3300A/B International Trade

(DS) *3333A/B Theories of Economic Development

3334A/B Economic Development: theories and debates

3336B Regional Development

3432 Regional Economics

4431A/B International Payments

(DS) *4440 Applied Development Economics

Education

5981 Issues in Adult Literacy
5985R Theory and Practice of Literacy Acquisition

English

217 African Literature

Environmental Studies

(DS) *5020A Resource Ecology and Economic Development

Geology

241B Environmental and Resource Geology

History

2130 British Empire and Commonwealth
(DS) *2370 Age of Imperialism
2380 Latin America: independence and after
2400A/B History of Tropical Africa
(DS) *2501A/B Middle East before/after WWI
2600 Modern East Asia
3330 The United States, Canada and the World
(DS) *3390 Empire and Revolution in the Caribbean
3450 South Africa since 1806
3612A/B Women in Socialist Society

Political Science

3303B Human Rights and Politics
3315B African Politics
(DS3000A) *3340A Problems of Development
3345A South Africa
2500 World Politics
2505 International Politics in the Post-War World
3531A UN in World Politics
(DS) *3535A Towards a New World Order
3540A Foreign Policies of African States
3544B Southern Africa
3590 The Politics of the Sea

Religion

2202 Religion and Culture in India

Sociology/Anthropology

2100 Ecology and Culture
2190 Sex Roles in Cross-Cultural Perspective
2230 Psychological Anthropology
2260 Culture and Political Behaviour
(DS2371) 2370 Peoples and Cultures of the World I
(DS) *2380 Peoples and Cultures of the World II
2400 Medicine and Health Across Cultures
(DS) *3060 Modernization and Development
3090 Population and Society
3210 Peasant Society and Culture

Spanish

207B Area Studies on Mexico and Central America
209A Women in Latin America
211A Cuban Cultural Revolution
213B Latin American Dictators
221A/B The Novel of the Mexican Revolution
223A/B Contemporary Latin American Prose
307A Contemporary Latin American History

*DS indicates proposed cross-listed courses eligible for inclusion in compulsory major and honours program.

Linguistics

Various departments offer classes in linguistics or in some aspect of linguistic study in the broad sense: French (3020 Linguistics, 3025A Linguistic Introduction to Acadian Dialectology, 4010A Great Linguists of the 20th Century, 4001 & 4002. History of the French Language, 3010 Phonetics, 4015 Advanced Translation into English, 4011B Lexicology, 4012 The Structure of French: Comparisons with English), English (201 The English Language, 202 History of the English Language, 253 Old English, 351 Middle English), Philosophy (3300B Philosophy of Language, 4510 Topics in the Philosophy of Language), Sociology and Social Anthropology (2270 Language and Culture), Psychology (3190 Psychology of Language), German (various classes), Russian (400 The Structure of Contemporary Standard Russian), Classics (several classes in Greek, Latin, Coptic, Syriac), Spanish (4040A Advanced Style and Syntax). Further information about these classes will be found under the departmental listing. It should be noted that some of the classes listed may not be offered in the current year.

Marine Biology

The Biology Department offers an Honours Degree in Marine Biology. The program is designed to provide a fundamental background in biological science while permitting concentration in marine biology. It prepares students for technical positions in marine biology and fisheries and for advanced research training in graduate school. It combines the resources of the Departments of Biology and Oceanography and other various marine-related sciences. Dalhousie is located very close to the sea coast, and these Departments are mainly in the Life Sciences Centre which has a complete flowing seawater system, the Aquatron. Other departments offer a selection of classes in economics, resource ecology and politics of the sea. The following is the suggested selection of classes:

Year I: Introductory Biology, Chemistry, Math and Physics, plus 1 Arts elective (writing class)

Year II: Ecology, Cell Biology, Marine Diversity, Ecosystems, Fish Biology, Organic Chemistry or Molecular Biology and Genetics, Statistics.

Year III: Algae, Physiology of Marine Animals, Invertebrates, Aquatic Microbiology, Genetics, electives.

Year IV: Honours thesis, Oceanography (Biological, Chemical and Physical, and Fisheries), Limnology, electives.

Suggested Electives: Resource Ecology and Economics, Marine Microbiology, Ichthyology, Coastal Ecology, Politics and Law of the Sea, Marine Geology, Physiology of Plants, Algal Physiology, Animal Nutrition, Topics in Seaweed Biology, Topics in Animal Physiology, Fish Population Biology, Field Ecology, Biology of Phytoplankton and Zooplankton, Theoretical Population Dynamics, Ecosystem Analysis. Program Coordinator, R.K. O'Dor.

Mathematics, Statistics and Computing Science

Chairperson of Department
K.A. Dunn

Professor Emeritus
M. Edelstein, MSc (Jerusalem), DSc (Technion-Haifa)

Professors
J. Borwein, MSc, DPhil (Oxford)
M.A.H. Dempster, MS, PhD (Carnegie-Mellon) (jointly with Business Administration)
C.A. Field, MSc, PhD (Northwestern) (Director of Statistics)
P.A. Fillmore, MSc, PhD (Minnesota), FRSC
R.P. Gupta, MSc (Agra), PhD (Delhi)
P. Keast, PhD (St. Andrews)
K.J.M. Moriarty, MSc (Dal), PhD (Lond.)
R. Paré, MSc, PhD (McGill)
J. Phillips, MA, PhD (Oregon)
H. Radjavi, MA, PhD (Minnesota)
W.R.S. Sutherland, MSc, PhD (Brown)
S. Swaminathan, MA, MSc, PhD (Madras)
K.K. Tan, PhD (UBC)
H.J. Thiebaut, MA (Oregon), PhD (Stanford) (jointly with Community Health and Epidemiology)
A.C. Thompson, PhD (Newcastle upon Tyne)
A.J. Tingley, MA, PhD (Minnesota)

Associate Professors
A.G. Buckley, MSc (Alta.), PhD (UBC)
J.C. Clements, MA (UBC), PhD (Tor)
K.A. Dunn, MSc, PhD (Tor.)
B.W. Fawcett, MSc, PhD (McMaster)
G. Gabor, MSc, PhD (Eotvos)
J.B. Garner, MSc, PhD (Nottingham) (jointly with Community Health and Epidemiology)
L.A. Grunenfelder, PhD (ETH Zurich)
C.S. Hartzman, MS (Purdue), PhD (Colorado)
R. Rosenberg, MSc (Tor.), PhD (Michigan) (Director of Computing Science)
P.N. Stewart, MA (Berkeley), PhD (UBC)
R. Wood, MSc (McM), PhD (Dal)

Assistant Professors
P. Borwein, MSc, PhD (UBC)
A.A. Coley, PhD (Lond.)
A. Garg, PhD (Tor.)
J. Gribble, PhD (St. Andrews)
D. Hamilton, MA, PhD (Queen's)
R.D. Holmes, MSc (Princeton), PhD (Dal)

K.P. Johnson, MSc (Tor.), PhD (Brandeis)
J. Mulder, PhD (UBC)
R.J. Nowakowski, MSc, PhD (Calg.)
C.C.A. Sastri, MSc (Andhra), PhD (New York)
A. Sedgwick, PhD (Tor.)
D.P. Wiens, MSc, PhD (Calg.)

Learning Centre Director
P. Stevens, MSc, (Delft)

Computing Lab Director
R. Hody, BSc (McG)

Statistical Consulting Director
P.E. Green

Postdoctoral Fellows
K. Dilcher
P. O'Neill
B. Solel
G.A. Willis

Degree Programs

One full credit in mathematics other than Mathematics 1020 and 1100 is required for a BSc degree.

Mathematics as an area of concentration

Students who plan to major in Mathematics should arrange a program in consultation with the department.

Majors in Mathematics must obtain at least four Mathematics credits beyond the 1000 level. Amongst these, the following are required: Mathematics 2000 (or 2500 or 2200), 2030-2040 (or 2130), and at least one credit beyond the 2000 level.

The credit beyond the 2000 level may be a statistics class.

Students wishing to concentrate in Applied Mathematics, Pure Mathematics or Statistics are advised to consider modelling their programs on the first three years of the suggested Honours programs (see below), after possibly replacing 2130R with 2030A and 2040B, 2500R with 2200R or 2000R, and 3500R with 3090A and 3100B. Those students who wish to arrange interdisciplinary programs (with such fields as Physics, Chemistry, Biology, Engineering, Psychology and Economics) are invited to discuss their interests with the department.

Honours in Mathematics

The following program is normally followed by students who plan to take honours in mathematics.

Entering students who have a strong interest or background in mathematics, or who contemplate taking honours, should enroll in a special section of Math 1000 and 1010.

Year 2: Mathematics 2130 and 2500. Mathematics 2130 may be taken in Year I by well-qualified students with the consent of the instructor, in which case another class may be selected in Year II.

Year 3 and Year 4: Mathematics 3030, Mathematics 3500 and five additional classes at least two of which are numbered 4000 or above.

Students may choose programs with a concentration in Applied Mathematics, Computing Science, Pure Mathematics or Statistics. Students wishing to concentrate in Computing Science should consider Combined Honours in Mathematics and Computing Science, and examine the separate Calendar entry for Computing Science.

All honours programs must be approved by the Chairman.

Those students wishing to take an Honours degree concentrating in Applied Mathematics are advised to consider a program similar to the following:

Year 1: 1000A; 1010B; CS1400A; CS1410B; 3 elective classes.

Year 2: 2500R; 2130R; 2070A; 2080B; 2270B; (Co-op Seminar) and 1-½ elective classes.

Year 3: 3500R; 3030R; 3110A; two of 3210A, 3300A, 3260B, an appropriate statistics class; 1-½ elective classes.

Year 4: 4400; the remaining two of 3210A, 3300A, 3260B, an appropriate statistics class; one and a half other classes at 4000 level; 2 elective classes.

Those students wishing to take an Honours degree concentrating in Pure Mathematics are advised to consider a program similar to the following:

Year 1: 1000A, 1010B, CS1400A; CS1410B; 3 elective classes.

Year 2: 2500R; 2130R; another full mathematics class; 2 elective classes.

Year 3: 3500R; 3030R; another full mathematics class; 2 elective classes.

Year 4: 4010A; 4140A; three other full mathematics classes, at least one of which is at the 4000 level; 1 elective class.

It is recommended that the additional mathematics classes include a statistics class, an applied class and a class in algebra, topology or complex variables.

Honours in Statistics

The honours program in Statistics will provide students with a comprehensive knowledge of both theoretical and applied statistics and will enable students to move easily into challenging employment or graduate work in statistics.

Entering students should take Math 1000/1010 and Computing Science 1400/1410 during their first year.

The program of study for years 2, 3 and 4 is as follows:

Year 2: Statistics 2070A, 2080B; Mathematics 2030A and 2040B, or 2130R; 2000R or 2500R.

Year 3: Statistics 3360A, 3460B, 3340A, 3380B; Mathematics 3090A, 3080B or 3100B or 3110B.

Year 4: Statistics 4060R, 4620A, 4070B.

In addition 2-5 further ½ classes are required from Statistics 3370, 4080, 4100, 4350, 4390 to make up the usual 9-11 class concentration.

Honours Comprehensive Examination

The Honours Comprehensive Examination in mathematics consists of a written paper of about 20-30 pages researched and prepared by the student during the spring term. The topic is decided on in conjunction with the supervisor of the Honours seminar. The paper is also presented to the seminar. The Honours Comprehensive Examination in statistics requires successful completion of Statistics 4070.

Combined Honours

Students interested in taking honours in mathematics or statistics and another subject as a combined program should consult the chairman of the department through whom a suitable course of study can be arranged.

A combined honours program may be appropriate for many. Students

contemplating a combined honours course in mathematics or statistics and another subject should, however, bear in mind that the work in either subject would probably be insufficient for admission to a regular graduate program. A qualifying year would usually be necessary.

Co-operative Education Program

The Co-operative education program integrates the usual honours program of 8 academic terms with 4 work terms of relevant industrial/ laboratory employment. The work terms, each of 4 months duration, are spent in industrial and laboratory positions primarily in the Maritime region. The work experience helps students see the applicability of their training in mathematics, statistics and computing science and helps them make intelligent career choices. Upon successful completion of the program the student receives the Honours Degree and the University transcript indicates that the program was a cooperative one.

It is possible to complete a Co-op degree in 4 1/3 years, although students should expect to take 5 years. There is some freedom in how the work term/academic term sequences may be arranged and students should be prepared to be flexible.

There are four Co-op programs available within this Department, in the areas of:

- Mathematics,
- Mathematics and Computing Science combined,
- Computing Science
- Statistics

A Combined Honours Co-op degree, combining Mathematics or Computing Science or Statistics and another appropriate subject, is possible. Students interested in such a program should consult the Director of Co-op Education.

Eligibility

Students are required to demonstrate

- sufficient academic potential;
- a suitability for and interest in Co-op education;
- successful completion of an appropriate combination of the classes M1000/1010 and CS1400/1410. Normally all four of the half-classes would have been completed.

Normally, students entering their second year of study may apply for admission to one of the Co-op programs. However, interested first-year students are strongly urged to contact the Director of Co-op Education as early as possible for advice on course selection.

Work Terms

It is ultimately the responsibility of the student to arrange the work term. The Program Director serves to co-ordinate the contacts between student and employer. Students are remunerated according to the employer's policies regarding permanent employees of similar training and education. At the end of each work term, each student must submit an acceptable work report.

It is important that students realize that successful completion of the work terms are an integral part of the course of study. Indeed, the advantages of Co-op Education derive directly from the successful interplay of academic knowledge and practical implementation. Consequently the work terms are central to Co-op Education.

Work terms are each of four months duration. Two consecutive work terms may be taken. Work terms are arranged subject to the student's academic preparation and the availability of suitable placements. Various combinations of work term/academic term sequences are permissible, subject to the approval of the Director of Co-op Education.

Under normal circumstances, the following criteria apply

At least 4 academic terms must be completed before the first work term is begun,

In any twelve-month period (of full-time study) at least one academic term must be completed,

The last semester in the program must be an academic term.

Co-op Seminar

This is a special seminar arranged for the benefit of Co-op students. Various topics of relevance to the work terms are discussed. The purpose of the seminar is to prepare students better for their work terms so that everyone involved in the work term — the student, the employer and the University — may benefit as much as possible.

Co-op students enrolled in their second year at Dalhousie must attend this non-credit seminar.

Academic Requirements

The academic requirements for Co-op students are similar, although not identical to, the requirements for standard Honours students. There are some differences in the courses required and the administration of the Honours Comprehensive Examination. In addition, all relevant Faculty regulations must be satisfied.

Additional Information

For additional information, course selection advice, and entry into one of the Co-op programs, contact the Director, Co-operative Education, Department of Mathematics, Statistics and Computing Science, Dalhousie University, Halifax, Nova Scotia, B3H 4H8.

First-year students who are interested in a Co-op program are urged to contact the Director before or during their first year for advice on course selection.

Mathematics Classes Offered

The listed prerequisites indicate the mathematical background expected of students entering any class but may be waived with the consent of the instructor.

Class descriptions for Computing Science can be found in the calendar under Computing Science.

Class descriptions for Statistics can be found in the calendar at the end of this section.

Credit may not be obtained twice for the same class even if the numbers have been changed.

0010R Fundamentals of Mathematics: lecture 3 hours (non-credit class). May be offered in place of senior matriculation mathematics as a prerequisite for first-year classes at the University. Normally, junior matriculation mathematics as taught in Grade XI in Nova Scotia is expected as a background but mature students or others who are well motivated are able to cope with this class. After a review of elementary algebra, functions (exponential, logarithmic and trigonometric) and analytic geometry are studied. In addition to preparing students for the calculus, the class is useful for those wishing to build up their knowledge of the fundamentals of mathematics for other reasons.

Note: The following two classes, Mathematics 1000 and Mathematics 1010, introduce the basic ideas of the calculus and together constitute a solid foundation for study in the Sciences (Physics, Chemistry, Biology, etc.), as well as for further study in Mathematics. These two half-classes are usually offered in both terms.

1000A/B Differential and Integral Calculus: lecture 3 hours, tutorial 1 hour. Prerequisite: Nova Scotia Mathematics 441 or equivalent. Credit will be given for only one of Mathematics 1000, 1100, 1120, and 1280. A self-contained introduction to differential and integral calculus. The topics

include: functions, limits, differentiation of polynomial, trigonometric, exponential and logarithmic functions, product, quotient and chain rules, applications of differentiation, antiderivatives and definite integrals, integration by substitution. A sequel to this class is Mathematics 1010.

1010A/B Differential and Integral Calculus: lecture 3 hours, tutorial 1 hour. Prerequisite: Mathematics 1000. A continuation of the study of calculus with topics including: techniques of integration, elementary differential equations and applications, Riemann sums, parametric equations and polar coordinates, sequences and series, Taylor series.

Note: Credit can be given for only one of Mathematics 1010 and 1290.

***1020R Mathematics for Liberal Arts Students:** lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. For students who wish to become acquainted with mathematics as an art rather than as a tool for the sciences. It discusses some of the more elementary yet interesting aspects of the subject with an emphasis on the historical origins of the various topics. Topics include elementary number theory, finite and infinite sets, graph theory, colouring problems, elementary topology, and topics from geometry. This class may not be used to satisfy the requirement that BSc students must have at least one full university class in mathematics.

1060A/B Introductory Statistics for Science and Health Sciences: (same as Statistics 1060A/B) lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. For description see Statistics 1060.

1070A/B Statistical Techniques of Scientific Experimentation: (same as Statistics 1070A/B) lecture 3 hours. Prerequisite: Mathematics 1060. For description see Statistics 1070.

***1080A Introductory Statistics for Pharmacy Students:** (same as Statistics 1080A) lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. For description see Statistics 1080.

1100R Mathematics for Commerce: lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. A survey of mathematical techniques useful in analyzing mathematical models in economics and management. The material covered in the class is similar to that presented in Mathematics 1000 together with an introduction to matrix algebra, the simplex method, maximization of functions of two variables and Lagrange multipliers. A survey class for students who are not going to take further work in mathematics. Students who are going to take other mathematics classes should take Mathematics 1000/1010 rather than Mathematics 1100. This class may not be used to satisfy the requirement that BSc students must have at least one full university class in mathematics.

***1120 Introductory Calculus for Pharmacy Students:** lecture 3 hours. Prerequisite: Mathematics 1080. This sequel to Mathematics 1080 is designed primarily for Pharmacy students. Calculus is introduced and computational techniques stressed. The techniques are applied to commonly occurring functions in pharmacy: namely power, exponential, logarithmic, and S-shaped functions. Basic topics include limits and continuity, the derivative, and the definite integral. At the end of the class elementary differential equations and their application to pharmacokinetics are discussed. Credit can be given for only one of Mathematics 1000, 1120.

1280A/1290B Differential and Integral Calculus for the Engineering Program: Prerequisite: Nova Scotia Mathematics 441 or equivalent. Mathematics 1280A includes a review of precalculus mathematics, functions, limits, continuity, differentiation and integration of polynomials, exponential, logarithmic and trigonometric functions. Applications to finding areas, graphing, maximum-minimum problems and related rate problems. Mathematics 1290B includes vector algebra, techniques of integration, numerical integration, lengths of curves, vectors, lines and planes in three dimensions,

surfaces of revolution, parametric equations and polar coordinates. 1280A is a prerequisite for 1290B.

2000R Intermediate Calculus: lecture 3 hours. Prerequisite: Mathematics 1010. Topics include: continuous functions and their fundamental properties, partial derivatives and applications, multiple integrals, geometry of Euclidean vector spaces with emphasis on three dimensions, elementary differential equations. Credit can not be given for more than one of Mathematics 2000, 2200, 2480-2490 and 2500.

***2020R Logic, Sets and Number Systems:** lecture 3 hours. Prerequisite: Mathematics 1010. Basic concepts from set theory and logic form the basis of this class. Symbolic logic is introduced and a working knowledge of the logical connectives, including the universal and existential quantifiers, achieved and used to make precise certain statements in mathematics. The concepts of a tautology and a proof are studied. The number systems are constructed from a Peano System and sufficient abstract algebra is introduced to make these constructions self-contained.

2030A/B Matrix Theory and Linear Algebra I: lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. This class, together with Mathematics 2040, is a self-contained introduction to Matrix Theory and Linear Algebra. Topics include: vector spaces, linear transformations, determinants, systems of linear equations. Students should note that this is a second-year class and, although it has no formal first-year prerequisites, mathematical maturity and ability to handle formal proofs at the level of a student who has completed Mathematics 1000 is expected.

2040B Matrix Theory and Linear Algebra II: lecture 3 hours. Prerequisites: Mathematics 2030 and 1000. This class is a continuation of Mathematics 2030. Topics include: similarity, diagonalization, inner product spaces. No more than one credit can be given for Mathematics 2030/2040 and 2130.

***2050R Problems in Geometry:** lecture 3 hours. Prerequisite: Mathematics 1010. This class is organized around a sequence of stimulating geometrical problems. A set of approximately 20 challenging problems is given to the students at the beginning of the year. The students are expected to attempt these problems throughout the year. Good students should be able to do some of these problems and are encouraged to present their solutions to the class for extra credit on the final grade. These problems are chosen so that their solutions use a wide variety of geometrical ideas (from Combinatorial, Projective, Inversive, Transformational, Topological, Differential and Non-Euclidean Geometry).

2070A/B Introduction to Probability and Statistics I: (same as Statistics 2070A/B) lecture 3 hours. Prerequisite: Mathematics 1000 For description see Statistics 2070.

2080B Introduction to Probability and Statistics II: lecture 3 hours. Prerequisite: Statistics 2070A and Mathematics 1010 or Mathematics 2030. Some knowledge of matrices is assumed. (Same as Statistics 2080B). For description see Statistics 2080.

2130R Linear Algebra: lecture 3 hours. Prerequisite: Mathematics 1010. For students who are interested in a broader and more basic understanding of the theory and techniques of linear algebra than is provided by 2030 and 2040. Topics include: the material of 2030 and 2040, canonical forms including the Rational Form and Jordan Form, inner product spaces including the Spectral Theorem for normal operators on finite dimensional vector spaces, linear programming and further topics in pure and applied linear algebra. This class provides an excellent background for further study in Mathematics. Not more than one credit can be given for Mathematics 2030-2040 and 2130.

***2200R Applied Intermediate Calculus:** lecture 3 hours. Prerequisite: Mathematics 1010. Designed with the needs of science and engineering students in mind. It includes the topics: functions of several variables, vector analysis, line and surface integrals, integral theorems, differential equations and series of functions of two and three variables. Credit can not be given for more than one of Mathematics 2000, 2200, 2480-2490 and 2500.

2270B Introduction to Numerical Linear Algebra: (same as Computing Science 2270B) lecture 3 hours Prerequisites: Mathematics 1010, 2030 and Computing Science 1410 (with a grade of B-or better). For description see Computing Sciences 2270B.

2300A/B Introduction to Models of Applied Mathematics: lecture 3 hours. Prerequisite: 1010 and Computing Science 1400. An introduction to the application of mathematics in the social and life sciences. About six problems are analyzed by developing and solving mathematical models. Deterministic, axiomatic, probabilistic, and simulation models are covered. Areas from which the problems are drawn include assignment and transportation problems, measurement theory, social choice, conflict resolution, inventory management, queuing, epidemiology, and resource management.

2480A/2490B Intermediate Calculus for the Engineering Program: Prerequisite: Mathematics 1290 or 1010. The topics for these two half classes include functions of several variables, partial derivatives, multiple integrals, indeterminate forms, improper integrals, infinite series, power series, Taylor and MacLaurin series, matrices, determinants, systems of linear equations, complex numbers, elementary ordinary differential equations. Students who take Math 2480/2490 may not also receive credit for 2000 or 2200.

2500R Introductory Analysis: lecture 3 hours. Prerequisites: Good standing in Mathematics 1010 and concurrent registration in Mathematics 2130. For honours students and other serious students of mathematics. This class forms the first half of a 2-year sequence in analysis and advanced calculus; Mathematics 3500 completes the sequence. Topics include: real and complex numbers, set theory, elementary topology of Euclidean space, limits and continuity, differentiation of functions of several variables, the Riemann integral, line and surface integrals, Green's, Gauss' and Stokes' theorems, power series. Credit can not be given for more than one of Mathematics 2000, 2200, 2480-2490 and 2500.

***2540A/B Basic Set Theory:** lecture 3 hours. Prerequisite: Mathematics 1000. A simplified introduction into basic topics of set theory. Matters discussed include: sets and relations, countable and uncountable sets, cardinality in general; partial order, maximal and minimal elements, functions and operations on them; elementary topology of the real line, continuity and related topics.

***2600A/B Theory of Interest:** lecture 3 hours. Prerequisite: Mathematics 1010 or 1100. A detailed examination of the theory of simple and compound interest. The syllabus includes the material on which the theory of interest portion of Examination 4 in the Society of Actuaries examination series is based. Some of the topics are: nominal and effective rates of interest and discount, force of interest, annuities, perpetuities, price of bonds, callable bonds, special topics. This class should appeal to students in mathematics, economics and commerce. Students interested in an actuarial career should take this class and are urged to consult the department for guidance in class selection and additional information.

***2800A/B Applied Mathematics for the Life Sciences:** lecture 3 hours. Prerequisites: Mathematics 1000, Biology 1000. A preparation for the mathematical aspects of advanced courses in ecology, genetics, and physiology. Topics include: complex numbers, vector spaces, discrete mathematics and linear algebra, and differential equations. Students are introduced to each area through examples drawn from various areas of biology. Mathematics majors may not apply credit for Mathematics 2800 towards the

major requirements, although they may take Mathematics 2800 as an elective.

***3010A/B Mathematical Logic:** lecture 3 hours. Prerequisites: Mathematics 2000 and 2040. Symbolic logic is introduced first so that students who have not had any previous experience handling connectives, quantifiers and tautologies have an opportunity to practice using them. Next propositional logic is studied. This system of mathematical logic affords the opportunity of studying a formal language which is quantifier-free and so introduces, in a relatively uncomplicated setting, the background for predicate logic. The work is carried as far as Henkin's Extended Completeness Theorem.

***3020A/B Set Theory and Foundations of Analysis:** lecture 3 hours. Prerequisites: Mathematics 2000 and 2130 (or 2040). This class concerns the basic objects of mathematics and the proper way of dealing with "infinity." It is essential for a clear understanding of most modern aspects of mathematics. The topics include: operations with sets, countable and uncountable sets, cardinal numbers, ordered sets, well-ordering, ordinal numbers, the axiom of choice and its equivalents, and axiomatics in set theory.

3030R Abstract Algebra, lecture 3 hours. Prerequisite: Mathematics 2040 or 2130. In this first class in abstract algebra the following topics are treated: groups, sub-groups, factor groups, homomorphisms, rings, ideals, Euclidean domains, polynomial rings, fields, unique factorization, irreducible polynomials, Sylow theorems, solvability of polynomial equations, Galois theory, and the Jordan canonical form.

***3040A/B Metric Spaces and Elementary Topology:** lecture 3 hours. Prerequisites: Mathematics 2000 and 2130 (or 2040). Topics include: metric spaces: bounded-, totally bounded-, compact- and complete sets in metric spaces; Lipschitz and contraction mappings; topological spaces; open and closed sets, bases; continuity, compactness, connectedness.

***3050R Differential Geometry and Tensor Analysis:** lecture 3 hours. Prerequisites: Mathematics 2000 and 2130 (or 2040). The material consists of two parts. The first part discusses the theory of curves and surfaces in three-dimensional Euclidean space. Topics include: theory of curves, surfaces, first and second fundamental forms, Gaussian and mean curvature, formulae of Weingarten and Gauss, geodesic curvature and geodesics. The second part consists of an introduction to Riemannian geometry, and, if time permits, an introduction to general relativity as an application of Riemannian geometry. Topics include: foundations of tensor calculus, differentiable manifolds, foundations of Riemannian geometry, absolute differentiation and connexions.

***3070A/B Theory of Numbers:** lecture 3 hours. Prerequisite: Mathematics 2040. The following topics are discussed: congruences and residues; elementary properties of congruences; linear congruences; theorems of Fermat, Euler and Wilson; Chinese remainder theorem; quadratic residues; law of quadratic reciprocity; Legendre, Jacobi and Kronecker symbols, arithmetic functions; algebraic fields; algebraic numbers and integers; uniqueness of factorization, definition and elementary properties of ideals; ideal classes and class number.

3080A/B Introduction to Complex Variables: lecture 3 hours. Prerequisites: Mathematics 2000. An introduction to the basic elements of complex analysis. Topics include: complex numbers, functions, differentiation and integration in the complex plane, some special mappings, series in general, Taylor and Laurent Series, residues, some principles of conformal mapping theory.

3090A Advanced Calculus I: lecture 3 hours. Prerequisites: Mathematics 2000 or 2200 and 2030. An introduction to Fourier Series. Topics covered include half range expansions, expansions on other intervals, convergence theorems, differentiation and integration of Fourier Series and the Complex

form of Fourier Series. Also an introduction to special functions, including Gamma and Beta functions and orthogonal polynomials and some of their properties is given. Additional topics covered include some implicit function theorems and an introduction to transformations.

3100B Advanced Calculus II: lecture 3 hours. Prerequisite: Mathematics 3090. Topics covered include some properties of functions defined by integrals: differentiation under the integral sign, tests for convergence of improper integrals, improper multiple integrals and functions defined by improper integrals. Also considered is the Fourier integral and various other integral transforms, a review of multiple integrals and vector field theory. Green's, Stokes' and the divergence theorems and related matters are also considered. Note: Not more than one credit can be given for Mathematics 3500, 3090A, 3100B and the previous class 300.

3110A Differential Equations: lecture 3 hours. Prerequisite: Mathematics 2000. One of the aims is to give students the ability to analyze and solve a number of different types of differential equations. Wherever possible, applications are drawn from the fields of physics, chemistry, biology, and other areas. The class is intended mainly for mathematics students interested in applications and for science students who wish to be able to solve problems arising in their major areas of interest.

3120B Differential Equations: lecture 3 hours. Prerequisite: Mathematics 3110. The topics discussed are of great importance to any student interested in applied mathematics. Areas include Euclidean spaces, Fourier series, orthogonal polynomials, Sturm-Liouville problems, the classical partial differential equations, and some applications to physics, chemistry and engineering.

3210A Introduction to Numerical Analysis: (same as Computing Science 3210A, and previously part of 3200R) lecture 3 hours. Prerequisites: Mathematics 2270, 2000 (or 2200, 2500). Some more advanced aspects of numerical linear algebra, including the Power Method and the QR Algorithm are examined. Various acceleration procedures for iterative processes are examined. Several forms of interpolating polynomials, Newton, Lagrange and Hermite are considered. Finite differences are also introduced. Numerical differentiation and integration is examined. In particular, interpolatory, Gaussian, Romberg and adaptive quadrature are discussed, and error estimates considered. Polynomial splines and some of their properties are introduced. Methods for solving nonlinear equations including the Newton Raphson method are considered. Special attention is paid to finding the roots of a polynomial. Throughout, the difficulties of implementing the various methods are discussed, and illustrated via assignments. Finally, some indication of the difficulties involved in multidimensional numerical analysis is given.

***3220B Numerical Solutions of Ordinary Differential Equations, (Same as Computing Science 3220B),** lecture 3 hours. Prerequisites: Mathematics 3110, 3210, 3090 (or concurrent registration in 3500.) Initial Value Problems are considered. Various methods, including Runge-Kutta and Predictor-Corrector are examined. The convergence and stability of the numerical methods is investigated and propagated error bounds and estimates sought. Also considered are starting techniques, variable order and/or variable step length strategies and automatic error control. Systems of equations and Stiff equations are discussed. Various methods for solving Boundary Value Problems (e.g. shooting methods and collocation are also discussed). Throughout, the difficulties of implementing various methods are discussed and illustrated via assignments and the use of various computer packages. A brief introduction to the numerical solution of Partial Differential Equations may also be included.

***3230B Applied Approximation Theory:** lecture 3 hours. Prerequisites: Mathematics 3210, 3090 (or concurrent registration in 3500). A review of

orthogonal polynomials and their properties is given, and basic concepts, function norms, and orthogonal systems introduced. The best approximation to a function in the Euclidean norm is obtained. The Weierstrass Approximation Theorem is given and Runge's phenomenon discussed. We also consider characterizing the best approximation in the uniform norm and methods for obtaining this best approximation. Economization of power series is also discussed. Fourier approximation is discussed, and the Fast Fourier Transform is examined. An introduction to Rational and Padé approximation is given and these techniques are compared with polynomial approximation techniques. Throughout, the difficulties of implementing the various methods is discussed and illustrated via assignments.

***3260B Foundations of Applied Mathematics:** lecture 3 hours. Prerequisite: Mathematics 3110. This one-term class surveys some of the powerful techniques employed by the applied mathematician to handle realistic problems in an analytical fashion. Asymptotic and perturbation methods form the central theme for the class, but some time is spent on differential equation theory and also on the study of a number of successful mathematical models that illustrate the various techniques. Topics include: superposition, heat flow, Fourier analysis, Sturm-Liouville Systems, generalized harmonic analysis, dimensional analysis and scaling, regular and singular perturbation theory, asymptotic expansions.

3300A Optimization I: lecture 3 hours. Prerequisites: Mathematics 2000, 2040. This class is an introduction to the concepts and applications of linear and nonlinear programming. Topics include the Simplex method for linear programming, duality and sensitivity analysis, convex programming, Kuhn-Tucker and Lagrange multiplier conditions, numerical algorithms for unconstrained and constrained problems. Some of these topics are illustrated by means of interactive computer packages.

3310B Optimization II: lecture 3 hours. Prerequisite: Mathematics 3300. This class continues on from the topics in 3300. Additional topics to be covered include network flow theory, graph theoretic matching problems, shortest route problems, discrete dynamic programming models, and combinatorial optimization with emphasis on integer programming problems.

***3320A/B Applied Group Theory:** lecture 3 hours. Prerequisites: Mathematics 2000, 2030. This interdisciplinary half-class is intended for third and fourth-year undergraduate and first-year graduate students in Chemistry, Mathematics and Physics. With some additional reading in Physics, it is equivalent to Physics 4480A. Topics include: review of matrices, fundamentals of groups, normal subgroups, homomorphisms, representations, character, orthogonality, symmetry groups in crystallography, role of symmetry groups in quantum physics and chemistry, normal modes and molecular vibrations.

***3330B Graph Theory and Combinatorics,** lecture 3 hours. Prerequisites: Mathematics 2000, 2040. The following topics are discussed: elements of graph theory, paths and cycles, Eulerian graphs, trees, planar graphs and the Euler polyhedral formula, Hamiltonian graphs, chromatic numbers, the five-colour theorems; items to be selected from the following topics to suit class: graphs and matrices, graphs and groups, extremal problems, and enumeration problems.

3500R Intermediate Analysis: lecture 3 hours. Prerequisites: Mathematics 2130, 2500. Mathematics 3500 continues the analysis sequence begun in Mathematics 2500. Topics include: number systems, metric spaces, compactness, continuous functions on metric spaces, Stone-Weierstrass theorem, Arzela-Ascoli theorem, sequences and series of functions and their properties, inverse and implicit function theorems, extrema, co-ordinate transformations. Credit can be given for only one of Mathematics 3090A, 3100B, 3280 and 3500.

4010A/B Introduction to Measure Theory and Integration: lecture 3 hours. Prerequisite: Mathematics 3500. A discussion of Lebesgue's theory of measure and integration on the real line. The topics include: the extended real number system and its basic properties; the definition of measurable sets, Lebesgue measure and the existence of non-measurable sets; the Lebesgue integral; differentiation of monotonic functions (e.g. the Cantor function), absolute continuity, the classical L^p spaces, Fourier series.

***4020A/B Analytic Function Theory:** lecture 3 hours. Prerequisites: Mathematics 3080 and either 3100 B or 3500. A second half-class in complex function theory. Topics include: review of analytic complex functions including topological properties of the plane, Mobius mappings, exponential, logarithmic, trigonometric and related functions, integration and the Cauchy theorem. Cauchy's integral formula, residues, harmonic functions, analytic continuation, entire and meromorphic functions, some results of conformal mapping; including the Riemann mapping theorem.

4030R Advanced Abstract Algebra: lecture 3 hours. Prerequisite: Mathematics 3030. This second class in abstract algebra deals with the structure of groups, rings, fields and modules. Topics which may be discussed include Sylow theorem, tensor products, Ext and Tor, modules over a principal ideal domain and Galois Theory.

***4050R Introduction to Algebraic Geometry:** lecture 3 hours. Prerequisite: Mathematics 3030. An introduction to the basic concepts of algebraic geometry.

***4080A/B Statistical Analysis of Spatially Coherent Systems:** lecture 3 hours. For Math majors the recommended prerequisite is Statistics 3370. For students in physical science, the natural prerequisite is Physics 4540A. (Same as Statistics 4080A/B). For description see Statistics 4080.

***4130A/B Analysis of Algorithms:** lecture 3 hours. (same as Computing Science 4130). Prerequisites: CS 3690 (with a grade of C- or better). See class description for CS 4130A/B.

***4140A/B Introduction to Functional Analysis:** lecture 3 hours. Prerequisites: Mathematics 2130 and 3040. An introduction to the basic principles of functional analysis including the following topics: infinite dimensional vector spaces, normed spaces, inner-product spaces, Banach and Hilbert spaces, linear and continuous linear functionals, the Hahn-Banach Theorem, the principle of uniform boundedness, dual spaces, weak * topology, and the Alaoglu theorem, the open mapping and closed graph theorems, and consequences and applications.

***4150A/B Functional Analysis:** lecture 3 hours. Prerequisite: Mathematics 4140. Topics include: topological vector spaces, locally convex spaces, normability, function spaces, strict convexity, uniform convexity, reflexive spaces, support functionals, geometry of convex sets and other topics.

***4160A/B Operator Theory:** lecture 3 hours. Prerequisites: Mathematics 4010 and 4140. An introduction to the theory and applications of continuous linear operators on Hilbert spaces, culminating with the spectral theorem, and including such topics as spectrum; adjoint; symmetric, self-adjoint, unitary, and normal operators; polar decomposition; differential and integral operators; C^* algebras; Gelfand Theorem; and the spectral theorem.

***4170A/B Introduction to General Topology:** lecture 3 hours. Prerequisite: Mathematics 3040. An introduction to topological spaces and includes the following topics: classification in terms of cardinality of bases, separation, etc., product spaces, Tychonoff theorem, compactness, compactifications, Tychonoff spaces, metrization.

***4180A/B Introduction to Algebraic Topology:** lecture 3 hours. Prerequisite: Mathematics 4170. An introduction to algebraic topology and including the following topics: homotopy type and the fundamental group, geometry of simplicial complexes, homology theory of complexes, chain complexes, homology groups for complexes, subdivision, induced homomorphisms, axioms for algebraic topology, singular homology, the singular complex, properties of cell complexes.

***4190A/B Differential Equations:** lecture 3 hours. Prerequisites: Mathematics 3500 (3090 and 3100) and 2030/2040 or 2130. Mathematics 3120 is recommended. Topics covered include existence and uniqueness theorems, continuity of solutions, Floquet theory, autonomous differential equations and their relation to dynamical systems and flows, periodic solutions and the Poincaré-Bendixson theorem.

***4200A/B Differential Equations - Qualitative Theory:** lecture 3 hours. Prerequisite: Mathematics 4190. Qualitative theory is concerned with what can be determined about the phase-portrait and the general behaviour of solutions of differential equations even though those solutions are not explicitly exhibited. Topics are selected from Liapunov stability theory, stable and unstable manifolds of singular points and periodic solutions, classification of plane singular points, structural stability, differential equations on manifolds and Hamiltonian systems. Various equations occurring in applications are qualitatively analysed. The precise topics and equations covered depend on the specific interests of the instructor and the students.

***4220A/B Introduction to Partial Differential Equations:** lecture 3 hours. Prerequisites: Mathematics 3110. This class is the first half of a two term sequence designed to introduce the student to the theoretical and numerical aspects of partial differential equations. Topics to be covered include: review of the theory of ordinary differential equations, classification of partial differential equations, solution of first order equations, the diffusion equation and random walk, Fourier Series and transforms, generalized functions, eigenfunction expansions.

***4230A/B Partial Differential Equations:** lecture 3 hours. Prerequisite: Mathematics 4220. This class continues the study of partial differential equations begun in 4220A. Topics to be covered include: The Rayleigh-Ritz method, Green's Functions, finite difference methods of solution, an introduction to the finite element method.

***4270A/B Numerical Software:** (same as CS 4270) lecture 3 hours. Prerequisite: CS 3210 (with a grade of C- or better). See class description for CS 4270 A/B.

***4300A/B Optimal Control Theory and Applications:** lecture 3 hours. Prerequisite: Consent of instructor. Initially the classical calculus of variations is studied and the sufficiency conditions emphasized. A constructive solution of the Euler equations is presented. Then the modern theory of optimal control is developed using techniques of mathematical programming. This approach is applied to a variety of problems such as economic growth theory, inventory control and regulator problems. Numerical methods are also presented.

***4310A/B Nonlinear Programming:** lecture 3 hours. Prerequisite: Consent of Instructor. A complete treatment of the mathematical theory which underlies the general problem of optimization of a real-valued function subject to a system of constraints. Examples and exercises of an Operations Research nature are used to illustrate the theory. The material studied in this class is a basic prerequisite for understanding and contributing to recent developments in mathematical programming.

4400A/B Modelling in Applied Mathematics: lecture 3 hours. Prerequisites: required Mathematics 3110, 3120; recommended Mathematics 3100, 3210, 3300. This course is concerned with the construction, analysis and

interpretation of mathematical models in the natural sciences with an emphasis on industrial applications. It is intended that the course will draw from and expand upon the theory developed in the prerequisites listed above. Some of the problem areas which will be explored are: discrete and continuous biological models, hydrodynamic models, wave propagation models and shocks as well as models required for the optimal control of dynamical systems.

***4660A/B Automata and Computability.** (Same as Computing Science 4660) lecture 3 hours. Prerequisites: Computer Science 1410; a 3000 level Mathematics class such as 3030. For description see Computing Science 4660.

8700 (non-credit) Co-op Seminar I

8701 (non-credit) Co-op Seminar II

8891 Co-op Work Term I

8892 Co-op Work Term II

8893 Co-op Work Term III

8894 Co-op Work Term IV

Statistics Classes Offered

Credit may not be obtained twice for the same class even if the numbers have been changed.

1060A/B Introductory Statistics for Science and Health Sciences: lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. (Same as Mathematics 1060A/B.) Through extensive use of illustrative real-life examples drawn from a wide variety of disciplines, the student is introduced to the basic concepts of statistics: data reduction, estimation, and hypothesis testing. The emphasis is on statistical concepts, rather than mathematical manipulations. The principal aim is to enable students to identify and formulate the statistical aspects of real-life problems and to become familiar with the statistical vocabulary most commonly used in scientific journals. The student requiring a more extensive exposure to the statistical methods of scientific experimentation should follow this class with Statistics 1070. Topics include descriptive statistics, elementary probability and distributions, estimation, hypothesis testing and regression. Statistics 1070 is a natural sequel for this class. Students may obtain credit for only one of Statistics 1060, 2070 and Economics 2223. Students planning to take higher level statistics classes are strongly advised to take Statistics 2070/2080 instead of 1060/1070.

1070A/B Statistical Techniques of Scientific Experimentation: lecture 3 hours. Prerequisite: Statistics 1060. (same as Mathematics 1070A/B). A continuation of 1060 including collection of techniques widely used in the experimental sciences. Topics include regression and correlation analysis, analysis of variance, and curve fitting techniques. The presentation of these topics includes consideration of the statistical aspects of experimental design. The objectives are: (1) to explain what information can be obtained from experiments through use of these techniques; (2) to explain the assumptions that must be satisfied before these techniques can be applied; (3) to illustrate the nature and methods of the necessary computations. Students may obtain credit for only one of Statistics 1060, 2070 and Economics 2222 and only one of Statistics 1070, 2080 and Economics 2223. Students planning to take higher level statistics classes are strongly urged to take Statistics 2070/2080 instead of 1060/1070.

***1080A Introductory Statistics for Pharmacy Students:** lecture 3 hours. Prerequisite: Nova Scotia Mathematics 441 or equivalent. (same as Mathematics 1080A). Designed primarily to fit the specifications of the College of Pharmacy. Most of the class is devoted to a study of elementary statistics

with applications to the Health Sciences. Topics include descriptive statistics, estimation, hypothesis testing, regression and analysis of variance. The last 20% of the class is intended to prepare students for Mathematics 1120B. Topics include functions and graphs, linear and quadratic equations, exponential and logarithmic functions. Credit can be given for only one of Statistics 1060, 1080.

2070A/B Introduction to Probability and Statistics I: lecture 3 hours. Prerequisite: Mathematics 1000 (same as Mathematics 2070A/B). A basic introduction to the concepts of probability and statistics. The subject matter is developed systematically with an emphasis on results of an important practical nature. The class is well suited for any student with a knowledge of calculus who wants a basic understanding of statistical procedures and tests. Topics include: descriptive statistics, counting techniques, combining elementary probabilities, normal theory estimation and inference for one and two samples, one way analysis of variance and simple linear regression. Not more than one-half credit can be given for Statistics 1060 and 2070 and Economics 2222.

2080B Introduction to Probability and Statistics II: lecture 3 hours. Prerequisites: Statistics 2070, and Mathematics 1010 or Mathematics 2030. Some knowledge of matrices is assumed. (same as Mathematics 2080). A continuation of 2070A, this class deals with commonly used data analysis techniques and related topics in probability theory and mathematical statistics. Topics include: discrete and continuous random variables, sampling distributions, central limit theorem, multiple regression analysis, analysis of variance, inference of binomial data, contingency tables. Natural sequels for this class are Statistics 3340, 3360, 3380, 3460, 4350 and 4390. Not more than one-half credit can be given for Statistics 1070 and 2080 and Economics 2223. Not more than one credit can be given for Statistics 2070/2080 and the previous class 206.

2090A Intermediate Statistics for Health Sciences: (same as Nursing 5020A) Prerequisite: Statistics 1060 or equivalent. This class is designed so that students will be able to select appropriate statistical methods to analyse categorical, ordinal and measurement data to carry out the analysis on the computer using the MINITAB and GLIM statistical languages. Topics to be covered include least squares methods and F-test in multiple regression and analysis of variance via regression, analysis of crossed and nested designs, rank methods, analysis of count or frequency data with log linear models, power of a test. This class is intended primarily for students in the Master of Nursing program and is NOT available for credit in the Faculty of Arts and Science.

3340A/B Regression and Analysis of Variance: lecture 3 hours. Prerequisites Statistics 2070/2080 and Mathematics 2030, or an equivalent knowledge of matrices. An introduction to regression with emphasis on the practical rather than the theoretical aspects. Topics include: fitting a straight line in matrix terms and fitting of general linear models, analysis of residuals, transformation of data, correlation, multiple and polynomial regression, weighted least squares, indicator variables, selecting the best regression equation, analysis of variance models and an introduction to non-linear least squares. This class makes extensive use of computer packages.

3360A/B Probability: lecture 3 hours. Prerequisites: Statistics 2070/2080 and Mathematics 2000. An introduction to the basic concepts of probability to illustrate the great variety of practical applications of probability in science and industry. Topics include: (a) Fundamentals; (b) the classical models; binomial and hypergeometric, the multinomial, the Poisson, exponential, and the uniform distributions; (c) definitions of random variables, independence, functions of random variables, and distributions of sums of independent random variables; (d) conditional events and their probabilities; their uses; (e) laws of large numbers and the Central Limit Theorem. Examples illustrating the applicability of probabilistic formulations are taken from the natural and physical sciences.

***3370A/B Stochastic Processes,** lecture 3 hours. Prerequisite: Statistics 3360. A development of concepts of: (a) Markov chains and continuous time Markov processes; (b) vector independence and the multivariate normal distribution; (c) stationary time series. Emphasis is on practical applications. The ability to translate from a physical context into the language of a probability model is stressed. This class is a natural sequel to Statistics 3360. Here, the notions of time and space indexing of probability models are introduced, and conditional probability techniques are developed to deal with models of natural phenomena.

***3380A/B Sample Survey Methods:** lecture 3 hours. Prerequisite: Statistics 2070/2080. The development of design and analysis techniques for sample surveys. Topics include simple, stratified and systematic random sampling, ratio and regression estimation, sub-sampling with units of equal and unequal size, double, multistage and multiphase sampling, non-sampling errors and non-respondents.

3460A/B Intermediate Statistical Theory: lecture 3 hours. Prerequisites: Statistics 2070, 2080 and 3360. This class provides an intermediate level coverage of statistical theory to provide a framework for valid inferences from sample data. The methods developed are based on the likelihood function and are discussed from the frequentist, likelihood, and Bayesian approaches. The problems of point estimation, interval estimation and hypothesis testing, and the related topics of sampling distributions, sufficiency, and Fisher Information are discussed.

4060R Advanced Statistical Theory: lecture 3 hours. Statistics 3360, 3460 and Mathematics 2000. This course is intended to provide a solid basis in statistical theory. The classical theory of estimation and testing provides a starting point. The Rao-Blackwell theory, Cramer-Rao bound, Neyman-Pearson theory and uniformly most powerful tests will be covered. From here, conditioning and invariance will be used to obtain good procedures in more complex situations. The theory will be developed in the context of specific problems including the general linear model. The basic ideas of robustness will be introduced followed by a discussion of goodness of fit models. The final part of the course will examine the asymptotic behaviour of a number of the statistical procedures developed in the course.

4070A/B Honours Project in Statistics: Prerequisite: successful completion of the third year Honours Statistics program. The student will carry out an independent statistical study or act as a major statistical contributor to a research project under the supervision of a faculty member. In addition the student will participate in the statistical consulting service.

***4080A/B Statistical Analysis of Spatially Coherent Systems:** (same as Mathematics 4080A/B) lecture 3 hours. For Mathematics majors the recommended prerequisite is Statistics 3370. For students in physical science, the natural prerequisite is Physics 4540. Techniques for the analysis of modelling of statistical relationships within a spatially coherent system are studied. Practical constraints in the construction of models and of estimation and prediction schemes for natural processes are illustrated with examples from weather and climate studies.

***4100A/B Statistical Decision Theory:** lecture 3 hours. Prerequisites: Statistics 3360, 3460, Mathematics 2030, and consent of instructor. Statistics may be formulated as the science of decision making under uncertainty. Decision theory applies to statistical problems the principle that a statistical procedure should be evaluated by its consequence in various circumstances. The central ideas of statistical decision making models are studied in this class: general decision problems, Bayes and minimax solution of decision problems, admissibility, invariance, sequential decision rules, testing as a decision problem, empirical Bayes rules.

***4350A/B Applied Multivariate Analysis:** lecture 3 hours. Prerequisites: Statistics 3340 and Mathematics 2130 or 2040 or 2270. The class deals with the stochastic behaviour of several variables in systems where their interdependence is the object of analysis. Greater emphasis is placed on practical application than on mathematical refinement. Topics include classification, cluster analysis, categorized data, analysis of interdependence, structural simplification by transformation or modelling and hypothesis construction and testing.

***4390A/B Time Series Analysis and Forecasting:** lecture 3 hours. Prerequisite: Statistics 3340. The analysis of univariate time series data is discussed. Topics include stationarity, transformation, differencing, autocorrelation, autoregressive-moving average models, identification, estimation, diagnostic checking and forecasting. The emphasis will be on model building using the approach of Box and Jenkins. Other topics such as exponential smoothing, seasonal adjustment and multivariate models may also be covered.

***4620A/B Data Analysis:** lecture 3 hours. Prerequisite: Statistical techniques useful as background for this class would include any techniques covered in Statistics 2070/2080, 3340, 3360 or 3460 although it is not necessary to have taken all of these prerequisites. Admission to the class is by consent of the instructor. A problem-oriented approach to statistical analysis. The problems discussed are based on real life data. Students are encouraged to develop novel approaches for data analysis problems of case studies. Some general techniques which arise in non traditional data analysis are presented in this class. Students are required to make a formal presentation of their work, which may involve data analysis of the case studies, or it may be mathematical development motivated by the case studies.

8700 (non-credit) Co-op Seminar

8701 (non-credit) Co-op Seminar

8891 Co-op Work Term I

8892 Co-op Work Term II

8893 Co-op Work Term III

8894 Co-op Work Term IV

Mediaeval Studies

The period commonly called the Middle Ages (approximately AD 400-1500) offers a unique opportunity to study Western culture as a whole. Indeed, any attempt to study a part of this period in isolation leads to a conviction that such an investigation can never be satisfying and that the walls between disciplines must be broken down and the literature seen in relation to the philosophy, the philosophy in relation to the history, and the history in relation to the languages. No matter what the vernacular tongue of any geographical area, there was one common language throughout Europe and one church, and the study of these leads inevitably to a consideration of paleography, art, architecture and music.

The field is a very large one and could become a fascinating and rewarding area for a certain type of student — the one who likes to immerse him-

self in his work and who feels that university studies need not involve storing knowledge in separate pigeon holes because his language course has nothing in common with the social science he is required to take.

The regulations for the Honours degree permit a structured program to be set up in Mediaeval Studies which cuts across traditional departmental lines while allowing considerable freedom in choice of classes.

The professors currently involved in this program are: R. Crouse, J. Doull, E. Segelberg (Classics); R. Dawson, H. Morgan (English); H. Runte (French); R. Haines (History); J. Aitchison (Political Science). A student who is interested in entering the program in Mediaeval Studies should speak to one of these faculty members, who will then refer him to the Administrative Committee for the planning of his course.

Structure

The Honours degree in Mediaeval Studies must have a major field consisting of 9 classes, selected from those with Mediaeval Studies numbers, which will include at least one in each of: a literature, history, philosophy and Latin. Other classes will depend on the individual student's interests, but all four disciplines must be represented. The minor field may be varied to suit the taste of the student: he may wish to continue into later periods in his favourite discipline or he may wish to acquire another language to help him in his work. No class in the minor field may be from the Mediaeval Studies group. The four classes not in the major field may be widely scattered: one or more of them may be 100-level prerequisites which may be necessary for later mediaeval work, e.g., introductory German or Latin.

Classes

The classes available from which a mediaeval grouping may be formed are given below. Some of them are on an *ad hoc* basis, depending on the needs of students in any given year. Staffing problems may require the omission of certain classes from time to time: students are referred to the Mediaeval Studies prospectus at the time of registration. The numbering of the classes reflects subject and department, rather than order of difficulty or of priority.

201 History of the English Language: (English 202)

202 Old English: (English 253)

203 Mediaeval Literature: (English 218)

204 Middle English: (English 351)

210 Mediaeval French Literature: (French 3300A, 3300B)

211 History of the French Language: (French 4001A, 4002B)

212 Courtly Novels and Poetry: (French 4300A, 4301B)

301 Mediaeval Life and Thought: (History 1990/5R)

304 Roman History: The Cultural History of the Roman World: (Classics 223)

307A England in the Later Middle Ages: (History 3009A)

309A Mediaeval England: (History 2101A)

310R Paleography (History 4010R)

311A/312B Mediaeval Europe: (History 2001A, 2002B)

313A/314B The Mediaeval Church: (History 3021A/3022B)

315A/316B Mediaeval Civilization: (History 3001A/3002B)

401 Mediaeval Philosophy (Classics/Philosophy 3380)

402 Latin Philosophical Texts (Latin 204)

403 Seminar on the Philosophy of the Church Fathers (Classics 440/5700)

404 Western Religious Experience (Religion 2101)

405 Religious Myths, Symbols and Rites: (Religion 2030)

Meteorology

A one-year diploma program in meteorology is available to qualified students with a general BSc degree in Physics or related subjects. For details, see under "Physics."

Microbiology

Head of Department

K.R. Rozee

Professor Emeritus

C.W. van Rooyen, DSc (Edin.), MD, ChB, FRCP, FRCP(C), FRC Path (Lond.), (Virology)

Professors

K.B. Easterbrook, PhD (ANU), (Structure and Function in Microorganisms, Bacterial Spines)

J.A. Embil, MD (Havana), PhD (Dal), FRCP(C), FACTM, Pediatrics (Clinical Virology; Herpes, Cytomegalovirus)

L.S. Kind, PhD (Yale), (Immunology, Reaginic Antibody Synthesis)

S.H.S. Lee, PhD (Dal), (Virology; Interferon)

D.E. Mahony, PhD (McG), (Bacteriology; Bacteriocins and L-Forms of Clostridia)

K.R. Rozee, PhD (Dal), Dip.Bact. (Tor.), (Viral Pathogenesis; Epidemiology)

C. Stuttard, PhD (Dublin), (Microbial Genetics)

C.E. van Rooyen, DSc (Edin.), MD, ChB, FRCP, FRCP(C), FRC Path. (Lond.), (Virology)

Associate Professors

T. Ghose, PhD (Calc.), Pathology (Immunopathology; Cancer Immunotherapy)

G.C. Johnston, PhD (York), Graduate Studies Coordinator (Genetic Control of Cell Division)

E.S. McFarlane, PhD (Dal), (Microbial Chemistry; Cancer Viruses)

D.B. Stoltz, PhD (McM), Undergraduate Studies Coordinator (Biology of Parasitic Insects; Insect Virology)

C. Stuttard, PhD (Dublin), (Microbial Genetics)

Assistant Professors

W.R. Duncan, PhD (Texas), Assoc. Prof., Surgery. (Transplantation Immunology)

T.J. Marrie, MD (Dal), FRCP(C), Assoc. Prof., Medicine (Clinical Bacteriology)

R.S. Martin, PhD (Giessen), Dip.Bact. (Lond.), Clinical Bacteriology

R. Rajaraman, PhD (Dal), (Cancer Cell Biology, Fibronectin)

Lecturer

G. Faulkner, PhD (Dal), Ultrastructure

Adjunct Professor

R.I. Carr, MD (Tor.), PhD (Rockefeller), Assoc. Prof., Medicine (Rheumatology).

The field of Microbiology includes the activities of viruses and cellular organisms such as bacteria, fungi, protozoa and algae. The Microbiology program is designed to provide the student with an understanding of microorganisms — their structure, function, diversity, and contribution to the biosphere, and attempts to provide a basic training which may serve as preparation for graduate or professional work in all fields of microbiology. The Department of Microbiology is located in the Sir Charles Tupper Medical Building and offers microbiology programs in the Faculties of Medicine, Health Professions, Arts and Science and Graduate Studies.

Degree Programs

There is no 3-year program with a Microbiology major. Students wishing to include Microbiology in other 3-year programs should take Microbiology/Biology 2100A/B, which is a prerequisite for most courses offered at Dalhousie in the disciplines of microbiology. Students interested in a major (3 year BSc) program will most likely choose Biology, and would have to complete normal core requirements in that department. Students interested in an honours program (see below) should consult the departmental advisor, preferably prior to registration for 2nd-year classes.

BSc with Honours in Microbiology

This program is recommended for students wishing to acquire the strongest possible background in the discipline of microbiology. It is particularly suited to individuals who may be interested in pursuing an academic or professional career in microbiology. The program is jointly administered by the Departments of Microbiology and Biology.

Year 1: Biology 1000, Chem 110, "Writing class," Math 1060A/1070B or 1000A/1010B, and one elective.

Year 2: Microbiology 2100A/B and an additional ½ class in microbiology*, Biology 2020A/B and 2030A/B, Biology 2110B and an additional ½ class (any subject), Chemistry 240, and one elective.

Year 3: Microbiology, two classes*, Biochem 3400B and one of Biochem 3200A or 3300B; Microbiology, one half-class*, and an additional ½ class (any subject); and one elective.

Year 4: Microbiology 4900 (Honours research and thesis); Microbiology, two classes*; and two electives.

*To be chosen from any of the courses listed below (see note 3).

Microbiology

30283A Microbial Genetics

31144A/41144B Virology

31155A/41155B Immunology

31188B Systematic Bacteriology

40224A/40224B Microbial Ultrastructure Project

40246B Microscopy

40257B Non-mammalian Cells as Microorganisms

40388B Advanced Microbial Genetics

4300D Cellular Immunology

4380D Medical Microbiology

Biochemistry

44028A Structural Organization and Replication of Genes

44046B Gene Expression

44224B Principles of Protein Synthesis

Biology

31116B Microbial Activities in Nature

31189A Mycology

31200B Advanced General Microbiology

31588B Applied Microbiology

33223B Parasitology

41100A Winter Microbiology

41101A Introductory Microbiology and Biochemistry

41133A Bacterial Physiology

5100A Winter Microbiology

Pathology

5102 Pathology

Notes:

1. Except where a course number has been specified, "microbiology" has been used in the sense of referring to the discipline, rather than to the department, see Note 9.

2. In year 2, Biology 2015 and Biology 202A/B can be substituted for Biology 2120A, 2130A and 2110B. The math requirement need not be satisfied in year 1. Students are advised to take 2100A and a 3000-level course in year 2 (2100 is the prerequisite for most 3000-level courses).

3. Note that the 9 classes required beyond the 1000-level courses of Microbiology 2100A/B, Biology 2020A/B, 2030A/B, and 2110B, two half-classes in Biochemistry (4000B and one of 4200A or 4300B), and 5 additional classes in the discipline of microbiology. Chemistry 240 is also required not for the purpose of satisfying Calendar regulation 111.11 but because it is a prerequisite for Biochemistry; see Note 5.

4. All students are required to take at least one half-class at the 3-4000 level in each of the following subjects: bacteriology, virology, immunology, microbial genetics, applied or industrial microbiology, and mycology (if available). Note that 2 half-classes equal one class.

5. The minor can be taken in any subject (except Microbiology). Specifically, minors in either Biology or Chemistry are possible. While more of the Biology courses listed above can be used in a minor, Chemistry 240 can be.

6. In year 4, the honors research thesis can be done in either the Microbiology or Biology Department, but the work must be of microbiological content.

7. Students should be aware of Calendar regulation 223 and note that certain advanced courses (eg 4114B) require that a particular grade be achieved in the prerequisite course.

8. Note that Calendar regulation 111.3 requires that of the 15 classes taken in years 2 to 4, 4 must not be in the major field.

9. This program will be jointly administered by a committee composed of members from both the Microbiology (Stoltz, 424-2880) and Biology (Novitsky, 424-3885) Departments.

BSc with Combined Honours in Microbiology and Biology

Students in this program must complete a number of core courses offered by the Microbiology Department (2100A/B, 3088A, 3114A, 3118A and 3118B; any course in bacteriology offered in the Biology Department may be substituted for Microbiology 3118B). Biology 1000 should be taken in year 1, and Microbiology 2100 in year 2. Research thesis work can be carried out in either Department. Advisor: Dr. B. Stoltz.

BSc with Combined Honours in Biology and Microbiology

This program is designed for students who desire at least exposure to Biology in general, with less specialization in the area of microbiology. Students in this program fulfill normal Biology Department core course requirements, but can do the thesis research in either department. Students should consult departmental advisors (CS Hicks, Biology; Dr. B. Stoltz, Microbiology) for further details.

Classes Offered

2100A/B Introductory Microbiology: lecture 2 hours, lab 3 hours, KPS 1000 and SHS 1100. This class is primarily designed for the needs of nurses and other health professionals, but may be taken by other interested students on request. It deals with the major groups of microbial pathogens as well as theories of immunity, infectious disease prevention and community health.

2100B Introductory Microbiology: lecture 2 hours, lab 3 hours, Dr. B. Stoltz (course coordinator), R.G. Brown, G.C. Johnston, J.A. Novitsky, C. Standard. Prerequisite: Biology 1100. An introduction to the basic concepts of microbiology through lectures, laboratory exercises, and observations. Topics include the structure, ecology, growth, genetics and physiology of microorganisms, as well as basic immunology. This course is a prerequisite for all the other microbiology courses listed below, with the exception of 3120. For the convenience of all concerned, no student will be registered into 2100 after the first laboratory session. It should be noted that students wishing to acquire extra experience in microbiology could take 2100A followed by Biology 3118B, Biology 3120B, or Microbiology 3118B in the same academic year.

2100B Biochemistry and Physiology of Microorganisms: (see Biology Dept.).

3120 General Microbiology: lecture 2 hours, lab 3 hours, SHS 1100. Prerequisite: Biology 1000. On permission of the instructor. Intended to provide a general knowledge of microbiology at an introductory level for students in the Health Sciences, this class is not considered to represent an alternative to 2100 in Arts and Sciences programs. Students who have taken 2100 may not register for this class. The lecture topics are divided into three sections. The first introduces the microbial world, the basic concepts and facts of structure and function, growth, genetics, and immunology. The second comprises a systematic survey of the medically important groups of microorganisms, with special emphasis on most common pathogens. The third section is concerned with the application of microbiology in health sciences, industry and ecology. Laboratory work is designed to complement the lecture materials and to provide experience in the isolation, identification, cultivation and control of microorganisms.

3125A Microbial Genetics: lecture 2 hours, lab/tutorial 3 hours, C. Standard and G.C. Johnston. Prerequisites: Microbiology 2100 and Biology 2100. The study of heredity in microorganisms especially bacteria and their viruses. Some of the topics include some discussion of the chemical basis of mutation, DNA replication, recombination and repair, the main emphasis is on mechanisms of gene transfer in microbes, gene mapping and the use of microbes as model systems for the study of general genetic phenomena including plasmids and transposable DNA.

3114A Virology: lecture 2 hours, lab/tutorial 3 hours, E.S. McFarlane (course coordinator). Prerequisite: 2100. Provides an introduction to Virology, and to some extent discusses all kinds of viruses - animal, bacterial, insect and plant. Important concepts relating to the isolation, biophysical characterization, classification and replication of viruses are considered.

3115A Immunology: lecture 2 hours, lab 3 hours, L.S. Kind. Prerequisite: 2100 or permission of the instructor. The structure, synthesis, regulation of production, detection and measurement of antibodies. Also to be discussed are topics in the fields of transplantation, tolerance, hypersensitivity, tumour immunology, complement and the genetics of the immune response.

3118B Systematic Bacteriology: lecture 2 hours, lab 3 hours, D.E. Mahony. Prerequisite: Grade of B- or better in 2100. A survey of several bacterial groups with particular attention devoted to bacteria of medical interest. Attention is given to those criteria which are regarded as important in the classification of bacteria, and to the techniques used to identify particular species.

4022A/B Microbial Ultrastructure Project: K.B. Easterbrook, D.B. Stoltz, G.T. Faulkner. Prerequisites: 3023A and 4024B. A research project using one or more of the skills acquired in Biology/Microbiology 4024B, selected by the student in consultation with the instructor.

4024B Microscopy: lecture 2 hours, labs 3 hours, K.B. Easterbrook, D.B. Stoltz, G.T. Faulkner and M. Willison (course coordinator). Prerequisite: A grade of B- or better in 3023A. This class is a corollary to Biology 3023A. Instead of considering biological ultrastructure, the class deals with some of the principal methods involved in the study of cell structure. Both light and electron microscopy, including ancillary techniques, are considered in depth. The importance of a proper understanding of the physical and chemical principles governing technical procedures is emphasized. During laboratory periods students have the opportunity to practice, or to watch demonstrations of, some of the techniques covered in the lectures.

4033B Advanced Microbial Genetics: lecture 2 hours, C. Stuttard, G.C. Johnston. Prerequisite: Microbiology/Biology 3033A. Selected topics in microbial and molecular genetics including plasmids, gene cloning, eukaryotic gene organization, specialized gene mapping techniques, genetics of industrial microorganisms.

4025R The Mammalian Cell as a Microorganism: lecture 2 hours, lab 3 hours, R. Rajaraman. Prerequisites: Biol. 2020, or 2015 and 2030, or permission of instructor. An in-depth analysis of current research in cellular and molecular biology in relation to the mammalian cell viewed as a microorganism. Various aspects of experimental cell biology including life span, cell cycle, cytogenetics, mutagenesis, somatic cell genetics, immunology by cell culture, radiation cell biology, induction of cancer by radiation, viruses, and chemicals, and its prevention, genetics and cytogenetics of cancer, are discussed. Laboratory exercises include selected cell culture methods, and other techniques of current interest.

4114B Topics in Virology: lecture 2 hours, lab 3 hours, E.S. McFarlane. Prerequisite: Grade of B- or better in 3114A. A class for advanced students in virology. Several aspects of virology are discussed in detail; e.g., virus structure and replication, viruses and cancer, viral genetics, virus-cell interaction, etc.

4115B Topics in Immunology: lecture 2 hours, L.S. Kind. Prerequisite: 3115A. Students read and discuss articles from the current immunological literature. While all major areas of immunology are included, the emphasis is on topics previously studied in 3115A.

4300R Cellular Immunology: lecture 3 hours, K.R. Rozee *et al.* Prerequisites: Prior course(s) in immunology and permission of course coordinator (K.R.R.) An advanced class designed to examine the biological characteristics of cells that make up the immune system in animals, the types of interactions that occur between these immunocytes, and the effect of molecules involved in such interaction.

4500R Medical Microbiology: lecture 3 hours, K.R. Rozee *et al.* Prerequisites: Previous course(s) in microbiology will be required. A course in the principles and practice of clinical microbiology as related to laboratory diagnosis of infection, microbial pathogenesis and the natural history of infectious disease.

4403A Structure, Organization, and Replication of Genes: (see Biochem. Dept.)

4404B Gene Expression: (see Biochem. Dept.)

4700 Special Topics: Consult department.

4900 Honours Research and Thesis

Cross-Listed Courses

Microbiol. 2100A is cross-listed with Biology 2100A.
 Microbiol. 2100B is cross-listed with Biology 2100B.
 Microbiol. 2110B is cross-listed with Biology 2110B.
 Microbiol. 3033A is cross-listed with Biology 3033A.
 Microbiol. 3115A is cross-listed with Biology 3115A.
 Microbiol. 3118B is cross-listed with Biology 3118B.
 Microbiol. 4022A/B is cross-listed with Biology 4022A/B.
 Microbiol. 4024B is cross-listed with Biology 4024B.
 Microbiol. 4025R is cross-listed with Biology 4025R.
 Microbiol. 4033B is cross-listed with Biology 4033B.
 Microbiol. 4114B is cross-listed with Biology 4114B.
 Microbiol. 4115B is cross-listed with Biology 4115B.
 Microbiol. 4403A is cross-listed with Biochemistry 4403A.
 Microbiol. 4404B is cross-listed with Biochemistry 4404B.
 Microbiol. 4900R is cross-listed with Biology 4900R.

Music

Chairperson of Department

C. van Feggelen

Professor

W.H. Kemp, MusBac, MusM (Tor.), AM (Harv.), DPhil (Oxon.)

Associate Professors

R.D. Byham, BM, MM (Ill. Wesleyan), (History and Keyboard Skills)
 P. Djokic, BMus, MMus (Juilliard), (Violin)
 D.M. Farrell, BA (St. Norbert Coll.), MMus, PhD (Wisc.), (Theory)
 E. Gonnella-Welch, Dipl of Art (Dundee Coll. of Art), LRAM (Royal Academy Lond.), (Voice)
 J. Morris, BA (DePauw), (Voice)
 P.A. Perron, BMus (McG), MMusEd (Holy Names College), (Music Education)

L. Stodola, BMus (Chic.), MMus (Juilliard), (Piano)
 J.S. Tittle, BS (Kent State), MM, DMA (Wisc.), (Theory and Composition)
 C. van Feggelen, (Guitar and Lute)
 D.F. Wilson, BFA (Carn. Inst. Tech.), MMus (Roch.), PhD (Case. W.R.),
 (History)

Assistant Professor

D.P. Schroeder, AMus, BA, MA (Western Ontario), PhD (Cantab.), (Theory & History)

Adjunct Assistant Professor

W. Tritt

Senior Instructor

T. Zonneveld, Dipl. (Teach.), Dipl. (School Mus.), Dipl. (Performance), (Royal Conservatory, The Hague), (Piano)

Part-Time Faculty

L. McVannel (1st year aural perception)
 D. Palmer (saxophone)

Music Education Lecturers

J. Armitage (band instruments)
 N. Babineau

Applied Skills Instructors

E. DuBois (flute)
 P. Evans (recorder)
 J. Faraday (percussion)
 F. Graham (organ)
 M. Graham (harpsichord)
 J. Rapson (clarinet)
 J. Stern (trumpet)
 I. Cowie (trombone)
 T. Grove (bassoon)
 F. Haines (piano tuner)
 H. Murray (piano accompanist)
 M. Pheby (oboe)
 J. Sommerville (horn)
 L. Turofsky (string bass)
 S. Walt (cello)

Special Lecturer and Musician

D. Palmer

The resources of the Music Department provide a thorough discipline to those whose demonstrated talent and specific pre-university training qualify them for specialization in music studies. Certain classes and ensembles are available to the non-specialist student who wishes to increase both musical awareness and involvement.

In the Bachelor of Music Program, the Department offers training to the prospective professional musician: performer, composer, theorist, historian or critic. Future teachers instructing in the elementary and secondary school classroom are provided with methods, skills and field experience in the Bachelor of Music Education Program. In our society today there are many vocations in which a working knowledge of various aspects of music is a desirable part: librarianship, media programming and production, arts management, recreational and therapeutic work, to name only a few. A carefully chosen BA (General) or combined Honours program could furnish a basic equipment for further studies in preparation for such professions. The truly contemporary listener, too, must acquire style-specific tools, if there is to be an informed response to the musical experience.

Thus the University's Music Department must be ready to serve many needs within a general standard of excellence. Crafts and skills, history and practice must be presented in an equilibrium flexible enough to be useful to each student's identity as a musical person.

Degree Programs in Music

Admission

Students wishing to enrol in a degree program offered by the Department of Music must fulfill the following admission requirements:

- (a) satisfy the requirements for admission to the Faculty of Arts and Science
- (b) demonstrate their proficiency as instrumental or vocal performers in an audition-interview
- (c) demonstrate knowledge of the basic rudiments of music theory (equivalent to Grade II Theory of the Royal Conservatory of Music of Toronto) in a written diagnostic test, to be arranged to coincide with the audition-interview.

Applicants failing their written rudiments test would be required to take preparatory lessons in music theory before entering a university music program.

When making application for admission to the University, prospective music students should request the supplementary application form for the Department of Music.

Applications to the Department should be received by the end of April; audition procedures should be completed by the end of May to ensure admission and scholarship consideration.

Students wishing to transfer from another institution into the Second or Third Year of their chosen Music program must take validation examinations in history, theory, aural and keyboard skills, and their applied major instrument before transfer of credits can be considered. Failure to pass an examination will necessitate enrollment in the appropriate First or Second Year class.

Bachelor of Music (BMus)

The BMus is a four-year program with sixteen out of twenty classes in music, plus graduation requirement. Upon successful completion of the second year, students may choose to concentrate in performance, music history and literature, or composition.

Common Curriculum

First Year: 1100R Applied Skills; 1350A History of Music I (Introduction); 1351B History of Music II (Baroque); 1200R Theory I; 1270C Aural Perception I; 1271C Keyboard Skills I; and an Arts and Science Elective, one full credit (Writing Course Elective).

Second Year: 2100R Applied Skills; 2350A History of Music III (Classics); 2351B History of Music IV (Romantic); 2201C Theory II; 2460C Conducting; 2270C Aural Perception II; 2271C Keyboard Skills II; and an Arts and Science Elective, one full credit.

Concentration in Performance

Third Year: 3100R Applied Skills; 3350A History of Music V (Mediaeval and Renaissance); 3351B History of Music VI (Contemporary Music); 3280C Counterpoint; 3282C Orchestration; 3199C Recital; Music Elective, one half credit; and an Arts and Science Elective, one full credit.

Fourth Year: 4100R Applied Skills; 4199C Area Graduation Requirement (Recital); 4280C Advanced Harmony and Counterpoint; 4281C Form and Analysis; Music Elective, 1 ½ credits; and an Arts and Science Elective, one full credit.

Concentration in Composition

Third Year: 3100R Applied Skills; 3350A History of Music V (Mediaeval and Renaissance); 3351B History of Music VI (Contemporary Music); 3280C Counterpoint; 3282C Orchestration; 3210R Composition; and an Arts and Science Elective, one full credit.

Fourth Year: 42881C Advanced Harmony and Counterpoint, 42891C Form and Analysis, 42901C Composition, 44100R Applied Skills (or equivalent performance credit), 42901C Area Graduation Requirement (Composition), Music Elective, one-half credit, and an Arts and Science Elective, one-half credit.

Concentration in History and Literature

Third Year: 3100R Applied Skills, 335DA History of Music W (Medieval and Renaissance), 335EB History of Music W (Contemporary Music), 3281C Counterpoint, 3382C Orchestration, 3310R Music in Canada, and an Arts and Science Elective, one-half credit.

Fourth Year: 42881C Advanced Harmony and Counterpoint, 42891C Form and Analysis, 42891R & 42891B Special Studies, 44100R Applied Skills (or equivalent performance credit), 42901C Area Graduation Requirement (Theory), Music Elective, one-half credit, and an Arts and Science Elective, one-half credit.

Standards

All students wishing to enter the third year of the BMus program must successfully complete all second-year music classes and achieve an overall average of B- in the music classes of the first and second years, including a minimum standing of C in both Music 1280 and 2281 and a minimum of B- in Music 2100.

Students wishing to enter the concentration in performance must achieve an average of B+ in Music 1100 and 2100, in history and literature, an average of B+ in Music 1280, 1281, 2280 and 2281 and demonstrate acceptable writing ability, in composition, submitted on a more original process to be assessed by the composition faculty.

Students in the BMus program must earn the minimum standing of B- in each of the music classes of the third and fourth years.

Students who at the end of the third year have not obtained at least five credits of B- or better in their music classes above the 1000 level will not be admitted to the fourth year without the explicit recommendation of the Department and the prior approval of the Committee on Studies.

Students must achieve a minimum standing of C in each of their Arts and Science electives.

Bachelor of Music Education (BMusEd)

The BMusEd program combines instrumental or vocal instruction, theoretically, aural and keyboard skills, historical knowledge and the methods and requirements needed by the music teacher in the elementary and/or secondary school classroom. Observation and field experience in classroom settings are a vital and important part of the program. Students will choose between a minimum in Classroom Music and Instrumental Music.

Common Curriculum

First Year: 1100R Applied Skills, 105DA History of Music I (Introduction), 105EB History of Music II (Baroque), 1280R Theory I, 1271C Aural Perception, 1271C Keyboard Skills, and an Arts and Science Elective, one-half credit (Writing Course Elective).

Second Year: 2100R Applied Skills, 2211C Theory II, 2271C Aural Perception II, 2271C Keyboard Skills II, 235BR History of Music III (Classical), 235EB History of Music W (18th Century), 2382C Conducting and Education, equivalent of one-half class.

Classroom Music

Third Year: 3100R Applied Skills, 3410R Elementary Methods, 3471C Field Experience, 3481C Advanced Choral Technique, 335DA History of Music W (Medieval and Renaissance), 335EB History of Music W (Contemporary Music), and Education, equivalent of one-half class.

Fourth Year: 4100R Applied Skills, 4401C Secondary Methods, 44471C Field Experience, 4482C Choral Arranging - Education, equivalent of one and one-half classes, and the equivalent of one full credit elective in Music or Music Education.

Instrumental Music:

Third Year: 3100R Applied Skills, 335DA History of Music W (Medieval and Renaissance), 335EB History of Music W (Contemporary Music), EdTech 3101C Band Instruments or 3481C String Instruments Education, one-half class, 3482R Elementary Methods, and 3471C Elementary Field Experience.

Fourth Year: 4100R Applied Skills, 4401C Secondary Classroom Teaching Methods, 44471C Secondary Classroom Field Experience, 3382C Orchestration, 4481C Band Instruments II, either 4481C Band Methods and Field Experience, or 4481C String Methods and Field Experience, one-half credit elective in Music or Music Education, and Education, equivalent of one-half class.

Bachelor of Music Education/Bachelor of Education

The BMusEd/BEEd is a five-year integrated program combining training in classroom Music or Instrumental Music (as described in the BMusEd or BEEd) with additional training in either elementary classroom teaching or a second teachable subject appropriate for secondary school. The program includes methods and field experience in both Music and in the second teaching area. The BMusEd/BEEd program is accredited by the Nova Scotia Department of Education.

Standards

All students wishing to enter the third year of either the BMusEd or BMusEd/BEEd program must achieve an overall average of B- in the music classes of the first and second years, including a minimum standing of C in both Music 1280 and 2281, and a minimum of B- in Music 2100. Other requirements BMus, BMusEd and BMusEd/BEEd.

With special permission, a student in the BMusEd or BMusEd/BEEd program may give a graduation report instead of a final jury exam.

Teacher Certification in Music

A student possessing an appropriate undergraduate degree in Music may enroll in a six-class program which may lead to certification by the Nova Scotia Department of Education. The applicant must possess a degree in Music from a recognized university which includes the equivalent of second-year Music Theory (Music 2271C).

The program will normally include:

Music

- 3400R Elementary Music Methods
- 3471C Elementary Music Field Experience
- 4401C Secondary Music Methods
- 44471C Secondary Music Field Experience

Education

- Special Education (One-half credit)
- Educational Foundations (Two full credits from sociology, history, philosophy, educational psychology)
- Elective in Music or Education (One-half credit)

In an audition/interview, an applicant must pass proficiency tests equivalent to the final examination in keyboard skills (Music 2271C) and aural perception (Music 2271C). Failure to demonstrate satisfactory skill in either of these areas will require that the student enroll in the appropriate class in addition to the six classes listed above.

Bachelor of Arts (Major in Music)

The BA (General) with a major in music is a three-year course, subject to

MUSIC

the regulations described in the section *Arts and Science: General Faculty Regulations and Degree Programs*. Students are required to complete Music 1100R, 1350A, 1351B, 1200R, 1270C and 1271C before entering the third year. Other classes, to a maximum total of 6 full credit classes, may be selected in consultation with the Department to suit a student's individual need and interests. Music Education classes are not considered applicable to this degree. Students in the BA (General) program enrolled in Applied Skills courses are required to pass jury examinations.

Students wishing to transfer from another institution into this course may be required to enrol in an Applied Skills Class at the First-Year level, depending upon the standard of their performance proficiency demonstrated in the audition interview.

Classes for Non-Majors

Classes offered as arts electives for non-majors are as follows:

- 1000R Man and His Music
- 2007R Guitar and Lute
- 2087R Electronic and Experimental Music
- 2010R Music of Non-Western Cultures
- 2011R History of Opera
- 2012R Music and Psychology
- 2013R The Evolution of Jazz

Classes Offered

Studies in Music History

1350A History of Music I: lecture 3 hours, D. Wilson. Prerequisite: A basic knowledge of musical notation and terminology equivalent to Grade II Conservatory standard. An introductory survey of music of the Classical and Romantic periods.

1351B History of Music II: lecture 3 hours, D. Wilson. Prerequisite: 1350A. Normal Co-requisites: 1200, 1270C, 1271C. A study of the history of the music of the Baroque period (c. 1600-1750) with an emphasis on the development of style and performance practices.

2350A History of Music III: lecture 3 hours, D. Schroeder. Prerequisites: 1200, 1350A, 1351B. Normal co-requisite: 2201C. A detailed study of the history of the music of the Classical period.

2351B History of Music IV: lecture 3 hours, D. Schroeder. Prerequisites: 1200, 1350A, 1351B, 2350A. Normal co-requisite: 2201C. A detailed study of the history of the music of the Romantic period.

3350A History of Music V: lecture 3 hours, D. Wilson. Prerequisites: 1200, 1350A, 1351B, or permission of the Department. A detailed study of the development of Western music in the Mediaeval and Renaissance periods with an emphasis on the development of style and performance practices.

3351B History of Music VI: lecture 3 hours, S. Tittle. Prerequisite: permission of the Department. The main trends in 20th century "serious" music, with particular emphasis on "new" musical practices.

***3310 Music in Canada:** lecture 3 hours, W.H. Kemp. Prerequisite: 1350A, or permission of the Department. An historical survey of music in Canada with emphasis on the socio-economic factors essential to the successful transplantation and growth of European musical culture in Canada. The class gives practical experience in research skills as they pertain to the specialized area of Canadian music. Students must research and compose reports on both historical and contemporary topics.

***3311 History of Opera:** lecture 3 hours, W.H. Kemp. Prerequisite: permission of the Department. An historical and analytical survey of operatic compositions from 1600 to the present day; opera as drama; changing tastes in operatic productions; operetta and musical comedy.

***2310 Music in non-Western Cultures:** lecture 3 hours. Prerequisite: permission of the Department. The functions and styles of traditional musics outside the Western traditional repertoire of composed music.

***3312 Music and Psychology:** lecture 3 hours, W.H. Kemp. Prerequisite: permission of the Department. The interrelationship of music and psychology, as it relates to and informs the listener, student, educator and professional musician. Topics include a) the perception of tones as a foundation for the appreciation of musical experiences, music as passing time and as information; b) musical taste and aesthetics from a psychological point of view; c) the social psychology of music; d) theories of learning and of behaviour as appropriate to musical training and performance; e) the diagnostic and evaluative testing of musical aptitude and ability; f) the function of music in therapy and in special education. A working knowledge of musical notation is a prerequisite to this study; no previous classes in Psychology are necessary.

***3313 The Evolution of Jazz:** lecture 3 hours, D. Palmer. A survey of the historical and social background of jazz and its musicians. The evolution of jazz styles is illustrated in live performances as well as on recordings. A knowledge of musical notation is not a prerequisite to this class.

4368A & 4369B Special Studies: Prerequisites: 2350A, 2351B, 3350A and 3351B. Individually directed research and writing under the supervision of an appropriate member of the Department.

Studies in Music Literature

Study in depth of the history and repertoire of specific performance idioms.

***3352A Chamber Music, to 1800:** lecture 3 hours.

***3353B Chamber Music, 19th and 20th Centuries:** lecture 3 hours.

***3354A Keyboard Music to 1750:** lecture 3 hours, R. Byham.

***3355B Piano Literature, 19th and 20th Centuries:** lecture 3 hours, R. Byham.

***4370C The Organ and its Literature**

4399C Area Graduation Requirement (Thesis)

Theory and Related Skills

1200 Music Theory I: lecture 3 hours, D.M. Farrell. Prerequisites: permission of the Department; a basic knowledge of music notation and terminology equivalent to Grade II Conservatory. Normal Co-requisites: 1270C, 1271C. A thorough knowledge of musical rudiments is presumed. The class begins with a survey of musical phenomena in general, subsequently of tonal music in particular. The material in this survey is immediately applied to two- and three-part writing, stressing both the harmonic and contrapuntal dimensions. In the second term, there is a concentration upon a complete grounding in the traditional four-part writing skills. This culminates in the study of the dominant seventh and elementary modulation.

1270C Aural Perception I: lab 3 hours, L. McVannel. Prerequisite: permission of Department. Normal Co-requisites: 1200R, 1271C. A class designed to correlate with 1200 and 1271C. Melodic, Harmonic, Rhythmic, Textural and Stylistic factors are visualized, performed and dictated systematically. Labwork in ear-training and sight-singing is done three times per week. Each student is a member of a small working section.

1271C Keyboard Skills I: lab 2 hours, R. Byham. Prerequisite: permission of Department; Normal Co-requisites: 1200R, 1270C. The development of basic skills in sight reading, score reading and harmonized accompaniment at the keyboard.

2201C Music Theory II: lecture 2 hours, D. Schroeder. Prerequisites: 1200, 1270C, 1271C. A continuation of 1200, covering the study of a complex modulation, altered chords and chromatic harmony. Emphasis is placed upon concepts of functional tonality by means of both written exercises in four-part harmony and analysis of Classic and Romantic compositions.

2270C Aural Perception II: lab 2 hours, L. Stodola. Prerequisites: 1200, 1270C, 1271C. This class provides further practice in melodic and harmonic dictation and sight-singing; it correlates with 2201. A special component deals with solmization skills in sight reading.

2271C Keyboard Skills II: lab 2 hours, R. Byham. Prerequisites: 1200, 1270C, 1271C. A continuation of 1271C.

3270C Aural Perception III: lab 2 hours, P. Perron. Prerequisites: 2201, 2270C, 2271C. Advanced sight-singing and dictation. Singing music of all periods on solfa syllables and letter names with emphasis on contemporary music. Dictation of modulating excerpts in four-part chorales. Chromaticism, modality, whole-tone and contemporary music are studied along with musical examples of more rhythmic complexity. Also included: singing and dictation of atonal compositions, advanced chords, sing and play exercises.

3280C Counterpoint: lecture 2 hours, D. Farrell. Prerequisite: The development of skills in polyphonic architecture in two- and three-voice 16th century contrapuntal style using canonic techniques. An introduction to 18th-century counterpoint: inventions, canons, and fugal expositions, etc.

3282C Orchestration: lecture 2 hours, S. Tittle. Prerequisite: 2201. A survey of the development of the orchestra and the orchestral instruments with an introduction to acoustics. Technique in the deployment of instrumental combinations is emphasized through practical exercises in scoring for a medium-sized orchestra common in the 20th century.

4280C Advanced Harmony and Counterpoint: lecture 2 hours, W. Kemp. Prerequisites: 2201C and 3280C. The application of acquired harmonic and contrapuntal technique to various instrumental and vocal textures and forms; chorale prelude and fugue.

4281C Form and Analysis: lecture 2 hours, W. Kemp. Prerequisites: 2201C, 2350A, 2351B and 3280C. Analytic study of the form and content of selected compositions in various styles and idioms.

Composition

3210, 4210 Composition I, II: S. Tittle. Prerequisites: permission of the Department, an interview with the instructor, and the submission of a folio of original compositions for assessment by the composition faculty. Particular works are analysed to serve as a springboard for original composition by the student. Students' works are evaluated in small group discussions and in individual tutorial sessions.

2287 Electronic and Experimental Music: lab 3 hours, S. Tittle. Prerequisite: interview with instructor. Introduction to the experimental Sound Studio. Recording, mixing, and tape manipulation techniques; analysis and composition of tape music; voltage control concepts, synthesizer theory and practice. Composition and live performance with electronics; group improvisation with both studio and personal resources. Design and execution of live performance situations which may include verbal, visual and other theatrical elements.

***4271C Advanced Improvisation and Keyboard Harmony.** Prerequisite: permission of the Department and an interview with the instructor. Intended for keyboard students, the class involves the development of skills in transposition, score reading, and continuo realization.

4282C Choral Arranging: lecture 2 hours, D. Farrell. See 4482C, Music Education.

4299C Area Graduation Requirement (Composition)

Performance

Note: The various levels of applied study indicate the year of study in the Department and are not intended solely as an indication of relative standard. Term gradings are based upon progress as well as upon the actual performing standard displayed in the jury examination.

In addition to the one-hour lesson, and appropriate to the idiom, group instruction in technique and repertoire may be a required part of all sequences of Applied Skills classes. 1100, 2100, 3100, and 4100, offered in all band and orchestral instruments, guitar and lute, piano, organ, harpsichord, recorder, voice. Normally all students receive one hour weekly individual lesson in their major performance idiom.

2460C Conducting: lab 2 hours, P. Djokic. Normal Co-requisites: 2201C, 2270C, 2271C. An introduction to the fundamentals of conducting.

3461C Advanced Choral Techniques: lab 2 hours, M. Graham. Prerequisites: Music 2201C, 2270C, 2271C, 2460C. Study of the distinctive features of conducting choral ensembles with emphasis on rehearsal technique, score preparation, interpretation and group methods of building vocal tone. Practical experience in conducting.

3199C Recital: Required of all third year Bachelor of Music students whose concentration is in Performance.

4199C Area Graduation Requirement (Recital)

Music Education

Prerequisites for all classes: permission of the Department, and an interview with the designated member of the Music Education faculty.

Core Classes

3400 Elementary Classroom Teaching Methods: lecture 3 hours, P. Perron. An introduction to the development of a music program at the elementary level. Emphasis is on how to teach song materials, movement and creativity, reading and writing skills and what to listen for in music. The educational philosophies of Kodaly and Orff are examined in some detail. Solmization, hand signs, rhythm names and body co-ordination are some of the skills to be developed.

3470C Elementary Classroom Field Experience: P. Perron. Students must spend a minimum of 100 hours in various elementary schools during the school year practice teaching (75%) and observing master teachers (25%). This consists of one morning per week during the university year and a three week period in April-May.

3480C Band Instruments: lab 2 hours, staff. A practical introduction to the principal band instruments. Group instruction is offered in flute, oboe or bassoon, saxophone, trumpet or French horn, trombone and tuba, and percussion. This class normally is restricted to students majoring in wind, brass or percussion instruments.

3481C String Instruments: lab 2 hours, staff. A practical introduction in group lessons to the instruments of the string orchestra. This class normally is restricted to students majoring in a string instrument.

4400C Secondary Classroom Teaching Methods: lecture 1 ½ hours, P. Perron. An introduction to the development of a music program at the secondary level. Emphasis is on how to teach a general music class exploring the use of song materials, music theory, movement and creativity and listening skills.

4470C Secondary Classroom Field Experience: P. Perron. Students must spend a minimum of 100 hours in various secondary school classrooms

MUSIC

during the school year practice teaching (75%) and observing master teachers (25%). This consists of one morning per week during the university year and a three week period in April-May.

4480C Band Instruments II: lab 2 hours, staff. A continuation of 3480C.

4481C Band Methods and Field Experience: lab 2 hours, J. Armitage. Prerequisite: 3460A. A survey of the literature for band, band methods for schools and purchase and maintenance of band instruments; supervised band leadership practice in the school setting.

4483C String Methods and Field Experience: lab 2 hours, N. Babineau. Prerequisites: 3460A; 3481C or permission. A survey of literature and string methods for schools and purchase and maintenance of string instruments; supervised string teaching practice in the school setting.

Electives

4461B Classroom and Recreational Instruments: lab 2 hours, J. Wood. The purpose of this course is to provide music students with skills and ideas that are practical and beneficial in music education. The student learns to play the ukulele to enable him or her to teach a ukulele class or use the instrument as part of the general music program. He/she learns to play the string bass in a functional style suitable for accompanying both choral and instrument ensembles. The pedagogy is directed specifically toward class teaching of a ukulele group, which includes both instrumental and choral work. The philosophy and methods are applicable to all class teaching situations.

4462A Guitar in the Classroom: lab 2 hours, C. van Feggelen. Introductory guitar instruction including vocal/choral accompanying methods and techniques for the school classroom setting, tablature reading and finger-style playing, development of skills in a variety of accompaniment and rhythmic figurations. Practical applications will be available in Music 3470/4470C.

4471C Field Projects: Under supervision, students design a project that results in an in-depth study of the theoretical and practical aspects of a particular area of music education. The project entails library research as well as working with specialists in the field.

***4473C Contemporary Music in the Classroom:** lecture 2 hours, A. Tilley. A study of certain specific 20th-century works and trends; active music making in the classroom; survey of the literature related to the use of contemporary music materials in the classroom (Schafer, Self, Paynter, etc.).

***4474C The Recorder in the Classroom:** lab 2 hours, P. Evans. Technique, methods, and literature of the recorder family as applied in the school setting.

4482C Choral Arranging: lecture 2 hours, D. Farrell. Prerequisite: 3282C. Arranging for the school choral ensemble.

Classes Available to Non-Majors

1000 Man and His Music: lecture 3 hours, W.H. Kemp. Designed for the interested listener who desires to acquire an informed response to musical experiences. A knowledge of musical notation and terminology is not a prerequisite. The class includes a survey of the evolution of music from primitive cultures to the modern age; music in contemporary society; music in non-Western civilizations; music and image; music and the related arts; the art and psychology of listening.

2007 Guitar and Lute: class 2 hours, ensemble, C. van Feggelen. Prerequisite: personal interview with instructor. For students with a serious interest in classical guitar and lute playing and for whom it is not possible to provide individual instruction. Basic playing technique and the history of fretted instruments.

2008 Modern Guitar: lab 2 hours, C. van Feggelen. Prerequisites: interview with instructor. A class for students with a serious interest in preparing for studio guitar playing and including jazz, folk, rock and accompanying idioms. Class instruction and ensemble playing in improvisation, score reading, chording and arranging.

The following classes, previously described, are also available:

2087R* 2287R Electronic and Experimental Music

***2010* 2310 Music of Non-Western Cultures**

***2012* 3312 Music and Psychology**

***2013* 3313 The Evolution of Jazz**

Ensembles

Participation in both large and small ensembles is required of all students whose major field of study is music in each of the years of the degree programs. Details of specific participation requirements are available in the Department of Music.

Membership in the various ensembles is open to the University and the community by audition.

Following is a list of the ensembles sponsored by the Department of Music:

0151 Chorale (1st year), 0252 Chorale (2nd year), 0352 Chorale (3rd year), 0451 Chorale (4th year).
 0152 Chamber Choir (1st year), 0252 Chamber Choir (2nd year), 0352 Chamber Choir (3rd year), 0452 Chamber Choir (4th year).
 0153 Symphonic Wind Ensemble (1st year) 0253 Symphonic Wind Ensemble (2nd year), 0353 Symphonic Wind Ensemble (3rd year), 0453 Symphonic Wind Ensemble (4th year).
 0154 Chamber Orchestra (1st year), 0254 Chamber Orchestra (2nd year), 0354 Chamber Orchestra (3rd year), 0454 Chamber Orchestra (4th year).
 0155 Jazz Band (1st year), 0255 Jazz Band (2nd year), 0355 Jazz Band (3rd year), 0455 Jazz Band (4th year).
 0156 Brass Ensemble (1st year), 0256 Brass Ensemble (2nd year), 0356 Brass Ensemble (3rd year), 0456 Brass Ensemble (4th year).
 0157 Musica Antiqua (1st year), 0257 Musica Antiqua (2nd year), 0357 Musica Antiqua (3rd year), 0457 Musica Antiqua (4th year).
 0158 Percussion Ensemble (1st year), 0258 Percussion Ensemble (2nd year), 0358 Percussion Ensemble (3rd year), 0458 Percussion Ensemble (4th year).
 0159 Opera Workshop (1st year), 0259 Opera Workshop (2nd year), 0359 Opera Workshop (3rd year), 0459 Opera Workshop (4th year).
 0160 Guitar Ensemble (1st year), 0260 Guitar Ensemble (2nd year), 0360 Guitar Ensemble (3rd year), 0460 Guitar Ensemble (4th year).
 0161 Small Ensemble (1st year), 0261 Small Ensemble (2nd year), 0361 Small Ensemble (3rd year), 0461 Small Ensemble (4th year).
 0162 Accompanying (1st year), 0262 Accompanying (2nd year), 0362 Accompanying (3rd year), 0462 Accompanying (4th year).

Oceanography

Chairperson of Department

A.J. Bowen

Professors

C. Beaumont, BSc (Sussex), PhD (Dal)
 A.J. Bowen, MA (Cantab.), PhD (Calif.)
 C.M. Boyd, MA (Ind.), PhD (Calif.)
 R.O. Fournier, MSc (Wm. & Mary), PhD (URI)
 C.J.R. Garrett, BA, PhD (Cantab.), FRSC
 E.L. Mills, BSc (Carl.), MS, PhD (Yale), FLS
 G.A. Riley, MS (Wash.), PhD (Yale), DSc (URI), FRSC *Emeritus Professor*
 P.J. Wangersky, ScB, (Brown), PhD (Yale)

Associate Professors

R.C. Cooke, BSc (Randolph-Macon), PhD (Dal)
 D.A. Huntley, BA (Cantab), PhD (Bristol)
 R.M. Moore, BA (Oxon), PhD (Southampton)

Assistant Professors

J.A. Koslow, BA (Harv.), BA (Wash.), PhD (Calif.)
 M.R. Lewis, BS, MS (UMd), PhD (Dal)
 K.E. Loudon, BA (Oberlin), MEd (Temple), PhD (MIT)
 L.A. Mayer, BS (URI), PhD (Calif.)
 B.R. Ruddick, BSc (UVic), PhD (MIT)

Assistant Professor (NSERC Research Fellow)

K.R. Thompson, BSc, MSc (UManc), PhD (Liv.)

Research Associate

N.E. Balch, PhD (Dal), *Manager Dalhousie Aquatron*

Honorary Research Associates

R.J. Conover, AB (Oberlin), PhD (Yale), Marine Ecology Laboratory, BIO
 J.S. Craigie, BA, MA, PhD (Qu.), Atlantic Regional Laboratory, NRC
 L.M. Dickie, BSc (Acadia), MSc (Yale), PhD (Tor.), Ocean & Aquatic Sciences, BIO
 F.W. Dobson, BSc, MSc (Dal), PhD (UBC), Atlantic Oceanographic Laboratory, BIO
 R.W. Doyle, MSc (Dal), PhD (Yale), Dept. of Biology, Dal
 J.A. Elliott, BSc (U. of S.), MSc, PhD (UBC), Atlantic Oceanographic Laboratory, BIO
 C.E. Keen, BSc, MSc (Dal), PhD (Cantab.), Atlantic Geoscience Centre, BIO
 W.D. Jamieson, BSc, MSc (Dal) PhD (Cantab), Atlantic Research Laboratory, NRC
 S.R. Kerr, BSc (Carl.), MSc (Qu.), PhD (Dal), Marine Ecology Laboratory, BIO
 G.T. Needler, BSc, MSc (UBC), PhD (McG.), Atlantic Oceanographic Laboratory, BIO
 J.A. Novitsky, BSc (Penn. St.), PhD (Ore. SU), Dept. of Biology, Dal
 S. Pearre, BSc (Virginia), MSc, PhD (Dal)
 B.D. Petrie, BSc (StFX), MSc (McG.), PhD (Dal), Atlantic Oceanographic Laboratory, BIO
 T.C. Platt, BSc (Nottingham), MA (Tor.), PhD (Dal), Marine Ecology Laboratory, BIO
 M. Sinclair, BSc Hons (Qu.), MSc (Southampton), PhD (Calif.) Fisheries & Oceans
 P.C. Smith, BSc MS (Brown), PhD (MIT/Woods Hole Oceanography Instit.), Atlantic Oceanographic Laboratory, BIO
 F.C. Tan, BSc (Taiwan), MSc (McG.), PhD (Penn. St.), Atlantic Oceanographic Laboratory, BIO

Honorary Adjunct Professors

B.T. Hargrave, BSc, MSc (Dal), PhD (UBC), Marine Ecology Laboratory, BIO
 D.J.W. Piper, BA, MA, PhD (Cantab.), Atlantic Geoscience Centre, BIO

Oceanography is an inter-disciplinary science that includes studies of tides and currents, the chemistry of sea water, plants and animals that live in the sea, and ocean bottom sediments and underlying crustal structures. Career oceanographers are employed in Canada in a few universities, in various federal laboratories that are engaged in both basic research and applied problems which meet a national need, such as fisheries investigations, exploration for offshore mineral resources, and studies of ice in navigable waters, and in a number of private companies interested in marine environmental protection or exploration.

A good background in basic science is a necessary prerequisite to entering the department. Properly prepared undergraduates are permitted to take one or more graduate classes as electives. There are graduate introductory classes which survey the entire field and advanced classes in each of the major specialties — physical, chemical, geological and biological oceanography, and fisheries biology.

In addition, several undergraduate classes are offered.

Classes Offered

1850R Introduction to Oceanography: lecture 3 hours, R.O. Fournier. Prerequisite: Restricted to second year, or more advanced students. A general survey of Oceanography showing how the oceans, which account for more than 70% of the earth's surface, function as a dominant environmental force. Consideration also is given to man's impact on this ecological system. Designed to give a background of feeling for the ocean, what oceanography is, and what oceanographers do. It is not a good "background to science" class, since little feeling will be obtained for scientific techniques which would otherwise be acquired in a laboratory class. Most of the material covered is descriptive rather than basic, inasmuch as it is impossible in the time allowed and the material covered to also teach the basic required sciences.

4120A Introductory Physical Oceanography: lecture 3 hours, staff. Prerequisite: Permission of the instructor. This class explores some of the physical forces driving the oceans, and describes the responses of ocean water to these forces. Scales of ocean motion discussed range from currents of oceanic dimensions, like the Gulf Stream, through tides and waves, right down to very small-scale random movements of water known as turbulence. The class also includes a brief introduction to practical aspects of physical oceanography.

4150A Introductory Biological Oceanography: lecture 2 hours, lab 1 plus hours, M.R. Lewis. Prerequisite: Biology 2060 or 2046 or equivalent and permission of the instructor. Quantitative descriptions of biological oceanographic processes are used to explore interactions with physical and chemical processes in various oceanic ecosystems. Topics discussed range from factors affecting rates of microalgal photosynthesis to expected response of the ocean ecosystem to global variation in carbon dioxide and climate. Laboratory emphasizes independent, original research.

4160A Fisheries Oceanography: lecture 3 hours, J.A. Koslow. Prerequisite: Biology 2060A or 2046A. Familiarity with calculus and statistical concepts helpful but not required. Permission of instructor is required. The ecology of fisheries with emphasis on the factors affecting their production and recruitment variability. Topics covered include physiology of fish production; classic management models; larval fish ecology; the effects of fishing and changing stock size, of climate, and of community interactions upon year-class variability.

4170B Introductory Physical and Chemical Oceanography: A class restricted to third and fourth-year students registered in the Marine Biology Honours Program.

The following classes are offered to graduate students in the Oceanography Department, but also form part of the BSc degree in Physics for those students intending to meet the educational prerequisite for a career in Meteorology, as established by the Atmospheric Environment Service. For further information, interested students should consult the Physics Department.

4210B Time Series Analysis in Oceanography: lecture 3 hours, D. A. Huntley. Prerequisite: Permission of the instructor. Much of the data collected in oceanography and other earth sciences are in the form of a time series; a measurement of a variable as it changes with time or place. Usually the simplest way of interpreting a time series is to divide it up into variations occurring in different ranges of frequencies. This class outlines some of the techniques for analysing time series with particular emphasis on spectral analysis and filtering.

4311A Fluid Dynamics I: lecture 3 hours, D.A. Huntley. Prerequisite: Permission of the instructor. An introduction to the kinematics and dynamics of fluid motion. Viscous flow, vorticity, boundary layers and potential flow are discussed, and the class ends with a brief discussion of the theory of lift on aerofoils. The class emphasizes mathematical theory as a guide to understanding the physics of fluid systems.

4312B Fluid Dynamics II: lecture 3 hours, C.J.R. Garrett. Prerequisite: Oceanography 4311A or permission of the instructor. The laws of fluid motion are applied to a varied list of topics including open channel flows, hydrodynamic stability, convection, turbulence and mixing, using a blend of mathematical theory and physical reasoning. A previous knowledge of methods of mathematical physics is desirable.

4410R Dynamic Meteorology: lecture 3 hours, C.J.R. Garrett. Prerequisites: Physics 4310R and permission of the instructor. The basic laws of fluid dynamics are applied to studies of atmospheric motion, including the planetary boundary layer, synoptic scale disturbances (the familiar highs and lows on weather maps), front and global circulation. Emphasis is on the blend of mathematical theory and physical reasoning which leads to the best understanding of the dominant physical mechanisms. The class includes an introduction to numerical techniques and their use in weather forecasting models and studies of climate.

Philosophy

Chairperson of Department
S. Sherwin

Professors

D. Braybrooke, BA (Harv.), MA, PhD (Corn.), FRSC Also in Political Science
R.M. Campbell, BA (Harv.), PhD (Corn.)
W.F. Hare, BA (Lond.), MA (Leic.), PhD (Tor.) (Major appointment in Education Dept.)
F.H. Page, MA (Tor.), DD (Pine Hill)
R.P. Puccetti, BA (Ill.), MA (Tor.), Docteur de l'Université de Paris (Sorbonne)
P.K. Schotch, PhD (Waterloo)

Associate Professors

N.C. Brett, BA (New Hampshire), MA, PhD (Waterloo)
S.A.M. Burns, BA (Acad.), MA (Alta.), PhD (Lond.)
R.M. Martin, BA (Col.), MA, PhD (Mich.)

Š. Sherwin, BA (York), PhD (Stan.)
T. Tomkow, BA (SFU), PhD (Cantab.)
T. Vinci, BA (Tor.), MA, PhD (Pitts.)

Assistant Professor

J.R. Katz, BA (Wright St.), MA (Manitoba), PhD (UBC)

Beginning in Philosophy

Everything people do or think about has a philosophical aspect, so there are many different ways of beginning in philosophy. Students new to philosophy can begin with any Exploratory Class.

First-Year Students are encouraged to take classes at the 1000-level. These exploratory classes are:

1000, 1010, 1020 Introduction to Philosophy
1030 Death and the Mind
1090 How to Win an Argument (half-year)
1100 Legal Thinking (half-year)

Some of these classes will share some meetings with corresponding classes in the 2000-level, but students who take them at the 1000-level may receive different assignments, may meet in tutorials for special attention and advice, and are graded by standards appropriate to a first-year class. Some of these classes fulfill the Faculty "Writing Requirement." (Check with the Department.)

All Students in any year may begin with any Exploratory Class in the 2000-level. These classes have no prerequisite, and are appropriate for students who have taken no philosophy as well as for students who have already done other Exploratory Classes, provided that they have not taken and will not take the corresponding class at the 1000-level. The 2000-level Exploratory Classes are:

2000 Introduction to Philosophy (full-year)
2030 Death and the Mind
2040, 2050 Introduction to Philosophy (half-year),
2070 Justice, Law, and Morality: Concepts Version
2080 Ethics in the World of Business
2110 Symbolic Logic
2130, 2140 Principles of Logic (half-year)
2160 Philosophical Issues of Feminism (half-year)
2170 (full-year) & 2710 (half-year), Existentialism
2180 Philosophy of Education (half-year)
2190 Logic for Computing
2200 Philosophy of Religion
2250 Religion and Human Behaviour
2260 Philosophy of Art (half-year)
2270 Justice, Law, and Morality: Regimes Version
2410 Philosophy of Psychology (half-year)
2420 Philosophy of Biology (half-year)
2540 Philosophy of History (half-year)
2550 The Marxist Approach to Historical Change (half-year)
2660 Chance and Choice (half-year)
2700 Philosophy in Literature
2750 Right or Wrong
2800 Ethics and Medicine

Going on in Philosophy

Any of the classes in the Exploratory group provides the student with a good introduction to philosophy. Students who wish to take more philosophy may take additional Exploratory Classes, or they may choose to take Core and Specialized Classes. Further Exploratory Classes broaden the student's acquaintance with topics and issues in philosophy. Classes in Core and Specialized groups deepen knowledge of particular topics, and develop skill in philosophical thinking.

Core Classes: deal with issues that are fundamental to understanding philosophy. They allow students to pursue, in depth, issues raised in Exploratory Classes. The Core Classes are:

- 3000 History of Western Philosophy
- 3050 Theory of Knowledge
- 3060 (half-year), & 3090 (full-year) Intermediate Logic
- 3100 Ethics
- 3150 Self-Deception (half-year)
- 3210 Philosophy of Law
- 3300 Philosophy of Language (half-year)
- 3350 & 3370 Ancient Philosophy (half-year classes)
- 3440 Personal Identity (half-year)
- 3510 Philosophy of the Social Sciences (half-year)
- 3610 The Rationalists (half-year)
- 3620 The Empiricists (half-year)
- 3630 Kant (half-year)
- 3650 (full-year) & 3670 (half-year), Philosophy of Science
- 3850 Metaphysics

Most core classes have the prerequisite of any Exploratory Class (see individual class descriptions below for particulars). The King's Foundation Year Program satisfies this prerequisite.

Specialized Classes: are for advanced students; the usual prerequisite is at least one Core Class (but consult individual class descriptions below). The Specialized Classes are:

- 3170 Theories of Feminism (half-year)
- 3360 Ancient Philosophy from Beginnings to VI Century AD
- 3380 History of Mediaeval Philosophy
- 3460 Mind and Brain
- 4080 Seminar in Exact Philosophy (half-year)
- 4110 Theories of Ethics and Mind
- 4120 Theory of Rational Decision (half-year)
- 4190 Topics in the History of Philosophy (half-year)
- 4200 Topics in Normative Theory (half-year)
- 4430 Seminar on Game Theory (half-year)
- 4450 (full-year) & 4530 (half-year), Theory of Action
- 4470, 4480 & 4490 Philosophy, Politics, & Economics Seminars (half-year classes)
- 4510 Topics in the Philosophy of Language
- 4600 Contemporary Theories of Religion
- 4940, 4960, 4980 (half-year), & 4950, 4990, 4970 (full-year) Directed Reading

Degree Programs

BA with Major in Philosophy: Students must take at least five* classes in philosophy including (a) At least one* of the following: 3000, 3050, 3100; plus (b) At least one* additional core class or at least one* of the following: 2110, 2130, 2140, 2190, 2660, 4080. All students planning to take a general degree in philosophy should talk to an undergraduate adviser in the department.

BA with Honours in Philosophy: Students wishing to specialize in philosophy should take an honours course. It is the normal preparation for graduate study in philosophy. Its requirements are at least ten* classes in philosophy, including: (a) at least one* of: 3000, 3050, 3100; plus (b) at least one* of: 2110, 2130, 2140, 2190, 2660, 3060, 3090, 4080; plus (c) at least two* core classes; plus (d) at least two* core or specialized classes.

*Note: classes in the department are either full- or half-year (i.e., full- or half-credit). When a number of classes is indicated in these requirements, that means the number of full-year classes, or the equivalent if some are half-year. Thus the requirement for two Core Classes may be filled by two full-year, or one full-year plus two half-year, or four half-year Core Classes.

Class Descriptions

Note: Many classes are listed as being Exclusionary to one another. This means that students may not take both classes so designated.

The class numbers designate classes which, prior to 1984-85, were numbered without the last digit (zero), e.g., the present class Philosophy 2130 was previously called Philosophy 213. The prerequisite and exclusionary designations below should be interpreted accordingly.

1000, 1010, 1020 Introduction to Philosophy: staff. An introduction to a variety of problems that have concerned people with philosophical interests. Classes and sections differ in subject matter and requirements, so consult the Department to find out which ones especially suit you. Note: Students may not take more than one of these classes. Students who are taking (or who have taken) 2000, 2040 or 2050 may not take 1000, 1010, or 1020. Note that 1010 and 1020 satisfy the Faculty "Writing Requirement."

1030 Death and the Mind: R.P. Puccetti. (Exclusionary to 2030). An enquiry into the nature of death, the possibility of survival, immortality and reincarnation, and the relevance of belief in an afterlife to the way we live our lives. Note that this class satisfies the Faculty "Writing Requirement."

1090 How to Win an Argument: half-year, T. Tomkow. (Exclusionary to 2150). This class is devoted to developing the practical skills involved in evaluating reasoning and producing convincing arguments.

1100 Legal Thinking: half-year, N. Brett. Examination of controversial legal cases leads to understanding the nature of law and the techniques of practical moral reasoning.

2000 Introduction to Philosophy: staff. See description for 1000, 1010, 1020 above. Note: Students may not take more than one of these classes. Students who are taking (or who have taken) 1000, 1010, 1020, 1040, 1050, 2040 or 2050 may not take 2000.

2030 Death and the Mind: R.P. Puccetti (exclusionary to 1030). See description for 1030, above. This class will be graded differently than 1030. Students wishing to satisfy the Faculty "Writing Requirement" must register for 1030, not 2030.

2040/2050 Introduction to Philosophy: half-year, staff. See description for 1000, 1010, 1020 above. Note: Students may take either one of these half-year classes alone, or may take both. Students who are taking (or who have taken) 1000, 1010, 1020, 1040, 1050, 2000, 2010, or 2020 may not take 2040 or 2050.

2070 Justice, Law, and Morality: D. Braybrooke. An introduction to political philosophy and ethics. St. Thomas, Hobbes, Hume, Locke, Bentham, Mill, Marx, Rawls, and other authors are considered to help answer questions such as: What is justice? What is its role in society? This class and 2270 are cross-listed with Political Science. Together they provide a comprehensive survey of the history of political philosophy.

2080 Ethics in the World of Business: D. Braybrooke. Business practices are sometimes in accord with moral principles, sometimes at odds with them. Where in business is it easiest to be scrupulous? Where is it hardest? Could things be changed for the better, and, if so, what would be involved?

2110 Symbolic Logic: R.M. Martin (exclusionary to 2130 and 2190). An introduction to an artificial language constructed so as to make the operations of reasoning more precise.

2130 and 2140 Principles of Logic: (half-year classes) R.M. Campbell and P.K. Schotch (Exclusionary to 2110 and 2190). Students cover the same material as in 2110, while also devoting considerable attention to the relation

between artificial languages and ordinary English, and to philosophical problems arising from the study of reasoning.

2160 Philosophical Issues of Feminism: half-year, S. Sherwin. An examination of arguments for and against feminism, and of practical and theoretical issues associated with feminism, such as abortion and preferential hiring. Concepts to be studied include equality, justice, rights, freedom, and discrimination.

2170 Existentialism: N. Brett (exclusionary to 2710). A general introduction to existentialist themes and authors, including Kierkegaard, Nietzsche, Sartre, and Camus.

2180 Philosophy of Education: half-year, W. Hare. An introduction to the philosophical problems of education: What is education? What ought to be its goals? Who should decide what should be taught? (Cross-listed in Education Department.)

2190 Logic for Computing: half-year, P.K. Schotch. This class introduces the concepts of elementary formal logic. Those aspects which apply to computing science, especially software design, are emphasized.

2200 Philosophy of Religion: F.H. Page. An introduction to the philosophy of religion, examining such questions as: Why is religion so difficult to define? Is it rational to believe in a divine being? Can religious experiences be validated?

2250 Religion and Human Behaviour: F.H. Page. A study of religion as a form of human experience and behaviour. Topics include: naturalistic theories of religion, the personal development of religion, religious conversion, meditation, and mysticism.

2260 Philosophy of Art: half-year, S.A.M. Burns. Examines questions such as: What is art? Can judgements of artistic value be rational and objective? Can fear of fictional objects be real fear? Can music be a language?

2270 Justice, Law, and Morality: Regimes Version: R. Eden. The problem of determining the best regime is considered through reading Tocqueville, Machiavelli, Hobbes, Montesquieu, Rousseau, Plato, and Aristotle. This class and 2070 are cross-listed with Political Science. Together they provide a comprehensive survey of the history of political philosophy.

2410 Philosophy of Psychology: half-year, T. Tomkow. What are the philosophical presuppositions of the scientific study of the mind?

2420 Philosophy of Biology: half-year, R. Campbell. What are the philosophical presuppositions of biology?

2540 Philosophy of History: half-year, D. Braybrooke. Can the study of history be scientific? Are there any historical laws? Is history working toward some discernible goal?

2550 Marxist Theory: half-year, S.A.M. Burns. Marxist Theory, both as philosophy and social science, is studied through an examination of major writings of Karl Marx. (Same as Pol. Sci. 2455B).

2660 Chance and Choice: half-year, staff (exclusionary to 3650). An introduction to the principles by which we can make scientific predictions and choose, logically, between different courses of action. The class examines the workings of chance, or probability, and the theory of games.

2700 Philosophy in Literature: R.M. Martin. A study of some philosophical themes in modern literature. All readings will be literary works.

2710 Existentialism: half-year, (exclusionary to 2170). See description under 2170.

2750 Right or Wrong: staff. How can one solve moral problems that arise from situations like suicide, abortion, sexual exploitation, violence, discrimination, and unfair business tactics?

2800 Ethics and Medicine: S. Sherwin. Modern medicine generates moral problems which cannot be settled on the basis of medical knowledge alone but need to be considered in the light of moral philosophy. Among these problems, to be considered in this class, are: abortion, euthanasia, informed consent, confidentiality, paternalism, coercion, and the allocation of scarce resources.

Core Classes

Note that students who have taken the King's Foundation Year Program have thereby satisfied the prerequisite for classes which list "Any Exploratory Class" as prerequisite.

3000 History of Western Philosophy: T. Vinci. Prerequisite: Any Exploratory Class or permission of instructor. The history of thought on several selected philosophical topics, traced by reading works of philosophers from the pre-Socratics through the XIX Century.

3050 Theory of Knowledge: T. Vinci. Prerequisite: Any Exploratory Class. A study of fundamental issues in the theory of knowledge. The class examines Skepticism, Rationalism, and Empiricism, and investigates the nature of knowledge, belief, meaning, evidence, and truth. Questions are raised about perception and memory and their relation to knowledge, as well as about our knowledge of ourselves and other people. Attention is given to ancient and modern authors.

3060 (half-year) & 3090 Intermediate Logic: P.K. Schotch. Prerequisite: 2110 or 2130 or permission of instructor. Devoted primarily to the study of formal semantics and its relation to symbolic language.

3100 Ethics: R.M. Campbell. Prerequisite: Any Exploratory Class. The main questions in this class are: Can an ethical theory have a rational basis? Can it ever provide a rational solution to practical ethical dilemmas? Readings from Hume, Mill, Kant, and contemporary authors.

3150 Self-Deception: half-year, S.A.M. Burns. Prerequisite: Any Exploratory Class. A study of the moral and conceptual issues surrounding the idea of self-deception. How is it possible? Is it a moral failing? Why is self-knowledge difficult?

3210 Philosophy of Law: N. Brett. Prerequisite: Any Exploratory Class. A study of normative and conceptual issues arising from reflection on our legal system. Abstract legal principles and concepts are dealt with in the context of specific statutes and judicial decisions, e.g., the Narcotics Control Act, the Morgentaler case.

3300 Philosophy of Language: half-year, R.M. Martin. Prerequisite: Any Exploratory Class. What does it mean to say that the elements of language have meaning?

3350 & 3370 Ancient Philosophy: (half-year classes). S.A.M. Burns. Prerequisite: Any Exploratory Class. The beginnings of Western philosophy are studied in the writings of Plato, Aristotle, and their predecessors.

3440 Personal Identity: half-year, R.P. Puccetti. Prerequisite: Any Exploratory Class. A consideration of what it is to be one and the same person through time, of the roles of memory and bodily continuity in this, and of the concept of a person.

3510 Philosophy of the Social Sciences: half-year, D. Braybrooke. Prerequisite: Any Exploratory Class. An examination of philosophical questions

about the presupposition, aims, and methods of the social sciences, for example, whether the quantitative methods of the natural sciences are appropriate in the social sciences. Cross-listed with political science.

3610 The Rationalists: half-year, S.A.M. Burns. Prerequisite: Any Exploratory Class. Descartes, Spinoza, and Leibniz.

3620 The Empiricists: half-year, S.A.M. Burns. Prerequisite: Any Exploratory Class. Locke, Berkeley, and Hume.

3630 Kant: half-year, T. Tomkow. Prerequisite: 3610 or 3620, or permission of the instructor. Special attention will be paid to Kant's metaphysics.

3650 (full-year) & 3670 (half-year) Philosophy of Science: T. Vinci. Prerequisite: Any Exploratory Class. Induction, probability, and explanation are studied with special attention to the nature of scientific theories. No scientific background is presupposed. Note: Students may not take both of these classes. Students may not take both 3650 and 2660, 4650, or 4670.

3850 Metaphysics: staff. Prerequisite: Any Exploratory Class. A study of topics such as the nature of substance and change, body and mind, cause and effect, and the concept of existence.

Specialized Classes

3170 Theories of Feminism: half-year, S. Sherwin. Prerequisites: At least two classes in women's studies or philosophy, or permission of the instructor. A study of the theoretic underpinning of the major feminist theories in critical comparison, concentrating on the ideological disputes and the implications for traditional approaches to social and political thought.

3360 Ancient Philosophy from its Beginnings to the VI Century AD: W.J. Hankey, J.P. Atherton. Special attention is given to Plato and Aristotle, and to the Greek Philosophy of the first centuries AD and its influence on developing Christian thought (Same as Classics 3360).

3380 History of Mediaeval Philosophy: R. Crouse. Anselm, Aquinas, Ockham, some XIII Century Augustinians and Averroists and late Mediaeval mystics are studied most closely; attention is given to related political, literary, and theological concerns. (Same as Classics 3380).

3460 Mind and Brain: R.P. Puccetti. An interdisciplinary approach, combining philosophical analysis and neuroscientific data to current controversies about the relation between brain function and conscious experience such as why consciousness evolved and how it is organized in the normal human brain.

4080 Seminar in Exact Philosophy: half-year, P.K. Schotch. Application of the techniques of formal logic to philosophical issues. Principal subjects: ethics (deontic logic), philosophy of science (logic of empirical theories), logic of possibility and necessity.

4110 Theories of Ethics and Mind: R. Campbell and R. Martin. Prerequisite: Consult instructor. This class examines the relation between ethics and various theories of psychology, of the mind/body connection, and of human identity.

4120 Theory of Rational Decision: half year, staff. A study of foundational problems in contemporary theory of rational decision, drawing on work by philosophers, psychologists, economists and mathematicians.

4190 Topics in the History of Philosophy: half-year, staff. Prerequisite: Any Core Class. Subject will change from year to year. Consult Department.

4200 Topics in Normative Theory: half-year, staff. Prerequisite: any core class. A study of a specific topic in ethics, political theory, or philosophy of

law. Possible topics may include theories of consent, rights, and the concept of needs.

4430 The Theory of Games as an Approach to the Foundations of Ethics and Politics: half-year, D. Braybrooke (seminar in Philosophy, Politics and Economics). Cross-listed with political science. For class description see Political Science 4485B/5485B.

4450 Theory of Action: R. Martin. Prerequisite: Any Core Class or permission of instructor. (Exclusionary to 4530). An investigation of the nature of action, seeking criteria for individuating, describing, and explaining actions. Subjects may include: causation and action and the roles of volitions, intentions, motives, and reasons; responsibility for actions, and the concept of free actions.

4470 Utilitarianism, Classical Liberalism, and Democracy: half-year, D. Braybrooke (seminar in Philosophy, Politics, and Economics) Prerequisite: Normally, classes in philosophy or political science or economics: consult instructor. The study of two beliefs characteristic of classical liberalism: that good government is strictly limited government, and that there is no standard for social policy beyond the combination of personal preferences. Cross-listed with economics and political science.

4480 Social Choice Theory: half-year, D. Braybrooke (seminar in Philosophy, Politics, and Economics). Prerequisite: See 4470. Arrow's theorem brings together the theory of voting and welfare economics, seemingly leading both (and the theory of democracy as well) to ruin. This class will consider how to cope with the problem. Cross-listed with economics and political science.

4490 The Logic of Questions, Policy Analysis, and Issue Processing: half-year, D. Braybrooke (seminar in Philosophy, Politics, and Economics) With the help of the logic of norms and the Prerequisite: see 4470. logic of questions, this class considers how political systems process issues and transform them (for better or worse) during processing. Cross-listed with economics and political science.

4510 Topics in the Philosophy of Language: T. Tomkow. Prerequisite: 3300 or permission of instructor. The examination of recent work in the philosophy of language and semantics including writings by Frege, Russell, Quine, Davidson, Stalnaker, Lewis, and Kripke.

4530 Theory of Action: half-year, (exclusionary to 4450). See description under 4450.

4600 Contemporary Theories of Religion: F.H. Page. Prerequisite: 2200 or permission of instructor. Present-day discussions of religion by well-known philosophers are studied.

4940, 4960, 4980 (half-year) & 4950, 4970, 4990 (full-year) Directed Reading: staff. Prerequisite: Permission of instructor. Consult department for details. Individual classes to suit special interests can be developed jointly by a student and an instructor.

Changes and Additions

As the Calendar goes to press before plans for the next academic year are completed, there may be significant changes in the classes listed above. Students should consult the Department for names of instructors and revisions.

Graduate Studies

The Department offers graduate classes leading to the MA and the PhD. Details can be found in the Calendar of the Faculty of Graduate Studies, and by consulting the Department's Coordinator of Graduate Admissions.

Physics

Chairperson of Department
W.G. Calhoun

Professor Emeritus

W.J. Archibald, W.A. (Dal.), PhD (Wrig.), DSc (UNB), DSc (Dal.), FRSC

Professors

D.D. Batts, WSc (Dal.), PhD (McG.), FRSC, **Dean of Faculty of Arts and Science**

W.G. Calhoun, WSc (Dal.), PhD (UBC)

D.W. Galtieri, BSc (Acadia), PhD (McM)

C.K. Hoyt, WSc (Dal.), PhD (MIT)

I.W.H. Leitch, WSc (Dal.), PhD (Cambr) (**George Munro Professor of Physics**)

D.B.L. Kestep, BSc (McM), WSc, PhD (McM)

H.W. Kaulzer, WSc, DSc (Bant) (**Kulam Research Professor**)

G.F.O. Longstaffe, BSc (Acad), WSc (Dal.), PhD (Lond)

R.H.H. March, BSc, WSc (Dal.), DPhil (Oxon)

Associate Professors

B.L. Blackford, BSc (Acadia), WSc (MIT), PhD (Dal)

J.K. Coates, WSc (Dal.), PhD (Cambr)

D.F. Gaulte, BSc, WSc (Acad), PhD (Tor)

S.T. Nugent, BSc (McM), BSc (NSFC), WSc (Tor), PhD (UNB), FERG

B.E. Paton, BSc, WSc (Waterloo), PhD (McG)

P.H. Reynolds, BSc (Tor), PhD (UBC)

A.M. Simpson, B.A. (Cambr), WSc, PhD (Dal)

G. Stovink, PhD (McG)

C.G. White, WSc (Dal)

Assistant Professors

R.A. Dunlop, BSc (Worcester), AM (Dart), PhD (Cam)

D.A. Timball, B.A., PhD (Cambr)

Assistant Professor (Research)

G.A. Gaulte, B.A. (Cambr), WSc, PhD (Tor)

Research Associates

K. DeBor, PhD (Lond)

A.K. Das, DPhil (Oxon)

Post Doctoral Fellow

S. Fujiki, PhD (Tohoku)

MacGregor Postdoctoral Fellow

K. Imai, PhD (Sheffield)

Adjunct Professors

H.W. Jones, BSc, PhD (Lond) FInstP, FERG

H.W. King, BSc, PhD (Birm), D.C. (Lond), FRSA, FInstP, FAW, CERG, FERG

A.D.J. O'Neill, WSc (McG), PhD (Sask)

R. Ravindra, BSc (Kharapur), W.A., PhD (Tor) (jointly with Religion)

MacGregor Teaching Fellows

N. Fujiki

P. Hargreaves

M. Mieszkowski

K. Nath

C. Puzell

O. Szemzau

Senior Instructor

R.W. Fyfe, WSc (Dal)

Instructor

W. Z. Neuklas, BSc (Dal)

Physics is the study of the fundamental properties of energy and matter, and of the space in which they are found. It seeks to describe and explain the gross diversity of nature with the fewest and simplest hypotheses, and to show the underlying similarities of seemingly diverse phenomena. It requires imagination and disciplined logic, and its success is judged by whether our natural intuition confirms its predictions when tested by experiment. An understanding of physics must be built on a good foundation. The various programs are arranged to do this in an orderly, efficient way.

First-Year Classes

There are three first-year classes. They all give a general introduction to physics, but each has its own particular approach and selection of topics. Only one first-year physics class may be used for credit towards a degree.

Physics 1000: is a survey class offering a wide range of topics in both classical and modern physics.

Physics 1100: is intended for students intending to make a study of engineering or physical science. Previous background in physics is desirable.

Physics 1300: is an introductory physics class which is oriented towards the health sciences.

Degree Programs

Bachelor's Degree/Major in Physics

Students intending to major in physics should include Physics 1100 and Mathematics 100A and 101B in their first-year program. (Physics 1000 and 1300 are not normally included in a "Major.") Physics 2400, 2400, 4020 may not be included in a "Major" to satisfy requirement 113. At least two 3000-level classes must be included, but in any one year, no student in a degree program may take only Physics 300A/3010B and Physics 330A/3310B.

Basic Major in Physics

(Example only, other possibilities exist):

Year I: 1100 (Math 100A & 101B), science, arts, elective.

Year II: 220A, 2210B, 230A, 2310B (Math 200 or 201), science, elective.

Year III: Two 3000-level Physics classes; one additional Physics class is recommended; electives.

Basic Major in Physics, with Diploma in Engineering

The physics content of this program might be as follows:

Year II: Physics 1100

Year III: Physics 220A, 2210B, 230A, 2310B

Year III: Physics 310A, 3170B, 320A, 3310B. Other possibilities exist.

For the remainder of the program, consult the Engineering Department.

Geophysics

For those interested in Geophysics, refer to classes 2050B, 3130A, 4270A, 4280B, and 4290B, listed under Geology.

BSc with Honours in Physics

All students who intend to take a BSc with Honours in Physics are encouraged to discuss their program with staff members of the department and to consult with the Chairman of the Department at the beginning of the second year.

The following classes will normally be taken.

Year I: Chemistry 110; Mathematics 1000A & 1010B; Physics 1100; arts or science elective; and an arts elective.

Year II: Science elective; two mathematics classes; and Physics 2110 and 2120.

Year III: Arts or science elective; Mathematics 3110A, 3120B; and Physics 3000A, 3010B, 3140A, 3150B, 3200A, 3210B.

Year IV: Arts, science or mathematics elective; and four physics classes at the 4000 level including 4000B, 4090A, 4100B, 4160A, 4150R, 4230B. A thesis and a comprehensive examination are also required.

Students with special interests pick electives carefully. The following suggestions may serve as a guide.

Applied Physics Option: Physics 3340B, 3350A, 3440B, 4200A, 4210A, 4220B, 4300A, 4330A, 4350B.

Theoretical Physics Option: Physics 4170B, 4180A/B, 4480A, 4650A/4660B; Mathematics 3640B, 3050, 3320A, 4140A.

Program in Engineering-Physics

The physics department participates in, and is responsible for teaching the physics components of the program leading to the degree of Bachelor of Engineering in Engineering Physics, awarded jointly by the Technical University of Nova Scotia and Dalhousie. For details consult the TUNS Calendar.

Combined Honours

Students interested in both Physics and another science may wish to take a BSc with Honours in Physics and the other subject combined.

Students contemplating such a program should in any case consult the Departments before the beginning of their second year of study.

Co-operative Education Program in Physics

The co-operative program provides physics students with an integrated pattern of academic study and supervised work terms in industry, government laboratories and institutes, etc. The program enables students to obtain a better appreciation of the practical problems they will face in their physics careers upon leaving the University. The work term experience gives students an opportunity to orient themselves at an early stage towards the practical application of their newly acquired knowledge, and adds to their motivation for academic study.

Eligibility

Students entering their second year of an honours program in physics or combined honours program at Dalhousie are eligible for admission.

The Work-Study Program

The program consists of 8 academic terms and 4 supervised work terms. The academic program and required classes are the same as for the BSc degree with Honours in Physics. In addition, in year 2, Co-op students are required to participate in the non-credit class and lecture series "Scientific Methods."

Further Information

For further information contact the Program Co-ordinator, Co-operative Employment Program in Physics, Department of Physics, Dalhousie University, Halifax, N.S. B3H 3J5.

Diploma in Meteorology

The one-year diploma in meteorology program consists of the following five classes: Physics 4500A/4510B, Physics 4520A/4530B, Physics 4540A/4550B, Oceanography 4410R, Oceanography 4120A, Math 4080B (or Oceanography 4210B). Students admitted to this program are eligible for consideration for AES-NSERC Studentships in Meteorology which, for 1984-85, are valued at \$4,000 per annum.

For admission into this program, which has a limited enrollment, a general BSc degree in Physics or other appropriate subject is required. A strong background in Physics and Mathematics is necessary, and classes taken should also include Statistics and Computing Science. For students enrolled in a BSc program at Dalhousie, the following classes are recommended: Physics 1100, 2200A/2210B, 2300A/2330B, 3160A/3170B, 4310; Math 1000A/1010B, 2000, 2030A/2040B, 2070A/2210B, 3110A/3120B; and Computing Science 1400A/1410B.

Classes marked * are not offered every year. Please consult the timetable on registration to determine if this class is offered.

Classes Offered

1000 Survey of Physics: lecture 3 hours, lab/tutorial 1 hour, P.H. Reynolds, C.G. White. A survey of physics, not normally accepted as a prerequisite to advanced classes in physics. It is designed for students in arts and science (and possibly also pre-medicine and pre-dentistry) who want to be exposed to a wide range of topics in physics. Topics covered include: motion, force, momentum, energy, heat, electricity and magnetism, waves, light, relativity, quantum theory and atomic radiations, the atomic nucleus and nuclear reactions, astrophysics and cosmology. Mathematics is used as a language for expressing the basic ideas of physics, but normally this is no more advanced than high school algebra and trigonometry. Problem sets are assigned on a regular basis. Help with these can be obtained at the after-noon tutorial hour or through the Physics Resource Centre. Two or three times each term the tutorial time will be used to carry out some simple laboratory experiments. Text: J.B. Marion, *Physics and the Physical Universe*, 3rd ed., Wiley.

1100 Introduction to Physics: lecture 3 hours (3 sections), lab 3 hours every 2nd week, M.G. Calkin, D.F. Goble, R.H. March. Primarily for students interested in the physical sciences. Students beginning this class should be familiar with algebra, graphs and trigonometry, and should be taking Calculus (Math 1000/1010) concurrently. This class concentrates on three main areas: mechanics, oscillations and waves, and electricity and magnetism. As far as possible, the basic ideas are introduced through inclass demonstrations, enabling students to relate the verbal and mathematical descriptions to events in the real world. In addition, students are able to explore the physical world via labs every second week. Text: Tipler, *Physics*, 2nd ed., Worth.

1300 Physics In and Around You: lecture 3 hours, lab/tutorial 3 hours, C.K. Hoyt. An introduction to physics for students in biology, pre-medicine, pre-dentistry and allied health sciences, not normally accepted as a prerequisite to advanced classes in physics. After introducing basic concepts in physics, every opportunity is used to apply these concepts by using realistic biological examples, e.g., forces and torques are directly related to muscle action, fluids to blood circulation, sound to hearing. Students beginning this class should be familiar with trigonometry and algebraic equations. Text: Kane and Sternheim, *Physics*, 2nd ed., Wiley.

2110/2120: These two classes are intended to be complementary, and for second-year honours students. Unless the circumstances are unusual, they should be taken together. The classes have a common laboratory, i.e. work done in the laboratory periods is included in the grade for both classes. Prerequisites are also common: Physics 1100 and Mathematics 1000A and 1010B. (Statistics have shown that a student with less than a "B" grade in Physics 1100 can be expected to have difficulty with 2110 and 2120.)

2110 Mechanics: lecture 3 hours, lab 3 hours, C.G. White. The first part deals with basic vector mathematics. Newton's laws of motion, motion in unaccelerated reference frames, the two principles of special relativity and their use in describing space and time intervals in unaccelerated reference frames, conservation of energy and momentum from both the classical and relativistic view point, and harmonic oscillations. The second part deals with wave motion in mechanics, electromagnetism, quantum theory. Fourier analysis of wave packets and pulses is included. Text: Berkeley Physics Course, Vol. 1 *Mechanics*, McGraw-Hill, 1965; Berkeley Physics Course, Vol. 3 *Waves and Oscillations*, McGraw-Hill, 1965.

2120 Electricity: lecture 3 hours, lab 3 hours, B.L. Blackford. The class begins by studying electrostatics, including the concepts of electric field and electric potential as physical quantities. Next, the motion of charge in conducting materials is discussed, leading to the solution of circuit problems involving capacitance and inductance. By considering the electric field of a moving charge in the light of the theory of relativity, the nature of the magnetic field is introduced and its properties discussed. Electric and magnetic fields in matter are also discussed. The laboratory work is designed to illustrate the physical principles discussed in the lectures and simultaneously to introduce students to the use of electronic apparatus and to the design of some simple circuits. Text: Berkeley Physics Course, Vol. 2 *Electricity and Magnetism*, 2nd ed., McGraw-Hill, 1984.

2200A/2210B Applied Physics is designed to acquaint you with the wide range of physical principles at play in the world around us. These principles are discussed in class but the major emphasis is on the practical aspects of physics. In the lab, you learn to apply principles of physics and modern measuring techniques in the solution of practical problems found in the world of science and technology.

2200A Waves and Vibrations: lecture 3 hours, lab 3 hours, A.M. Simpson. Prerequisite: a first-year class in physics. Subject material: theory of measurements, mechanical vibrations, synthesis of waves, acoustics, resonance, interference. Text: French, A.P., *Vibration and Waves*, Norton.

2210B Electromagnetic Waves: lecture 3 hours, lab 3 hours, A.M. Simpson. Prerequisite: 2200A. Subject material: electromagnetic spectrum, geometric optics, interference, diffraction, matter waves, theory of solids, semiconductors. Text: D. Halliday and R. Resnick *Physics*, Part 2, Wiley, 1978.

2220A* Radiation Physics: lecture 3 hours, G.F.O. Langstroth. Offered in alternate years beginning in 1982-83. Enrollment is limited. Prerequisite: First-year physics or approval of instructor. Contents include: nature and origins of radiation, and the interaction of radiation with matter.

2230B* Radiation Physics, Applications: lecture 3 hours, G.F.O. Langstroth. Offered in alternate years beginning in 1982-83. Enrollment is limited. Prerequisite: Preference given to students who have taken 2220A. The class follows on the background obtained in Physics 2220A. It discusses the detection of radiation and its application in the health sciences and elsewhere. It then continues to treat the physical principles of devices in common use, which may include optical instruments and electronic instrumentation. Topics vary according to the interest of the students.

2300A/2330B For second year science and engineering students who wish to take a second class in physics, in addition to Physics 2200, 2210 or who for some reason are unable to take that class. Students may take third-year physics if they have taken this class and Physics 2200, 2210.

2300A Mechanics: lecture 3 hours, R.H. March. Prerequisites: Physics 1100, Mathematics 1000A and 1010B. The basic laws of classical mechanics. It covers similar material to that of Physics 1100 but with a more advanced mathematical treatment which allows for more detailed application of the basic laws to specific physical examples, e.g., examples involving

rotation and planetary orbits. Text: Kleppner and Kolenkow, *An Introduction to Mechanics*, McGraw-Hill, 1973.

2330B Electricity and Magnetism: lecture 3 hours, J.G.O. Cordes. Prerequisite: Physics 2300A. The basic laws of classical electricity and magnetism and the application of these laws to the analysis of electric and magnetic fields in solids. The discussion of fields in solids leads to some reference to quantum effects. A brief treatment of some common electrical circuits is also included.

2450 Astronomy: lecture 3 hours, D.A. Tindall. Prerequisite: One first-year science class. An introduction to Astronomy for the general science student, not the physics specialist. Topics discussed include: the observation and exploration of the planets, the origin and evolution of stars (including white dwarfs, pulsars, quasars, black holes), the structure of galaxies, and cosmology. Text: Pasachoff and Kutner, *University Astronomy*, Saunders, 1978.

2500* Astronomy and Introductory Astrophysics: lecture 3 hours, D.A. Tindall. Offered in alternate years, beginning in 1981-82. Prerequisite: Physics 1100 or permission of instructor. This is a basic class designed primarily for students who may wish to pursue more advanced studies in astronomy or in astrophysics. It is appropriate for a physics major or an honours physics student. Mathematics and the laws of physics are applied to show how quantitative information follows from observational data, and how a consistent picture emerges of the structure and evolution of the universe. Text: Pasachoff and Kutner, *University Astronomy*, Saunders.

3000A/3010B Experimental Physics: lab 6 hours, lecture 3 hours, R.A. Dunlap. Prerequisites: For honours students, Physics 2110, 2120. For major students, Physics 2300A, 2330B, 2200A, 2210B. Exceptions have been made. Designed to give students a chance to do non-set experiments and thereby encounter and solve on their own the problems of experimentation. As the number of experiments is small (four to six), students should achieve a real understanding of a few physical phenomena. Topics cover a wide range of fields such as atomic physics, nuclear physics, solid state physics and electronics. A measurement of one of the fundamental constants such as c , G or e is required. Other than this the student is free to choose the field of experimental study.

3005A/3015B Experimental Physics: lab 6 hours, as for 3000A/3010B, but without the lectures. Available only to Engineering-Physics students from TUNS.

3140A Introduction to Quantum Physics: lecture 3 hours, C.G. White. Prerequisite: Mathematics 2000 or its equivalent. This introduction to quantum physics first analyses difficulties of classical physics (black body radiation, radiation from accelerated charges and atomic spectra). The experimental basis of the wave-particle duality of light is discussed and the existence of diffraction patterns for particles is used to motivate the construction of wave equations for particles. The determination and interpretation of solutions of Schrödinger's equation is illustrated by simple examples. The three dimensional Schrödinger equation is discussed, with special emphasis on the hydrogen atom. The concept of electron spin is also introduced. Text: P.C.W. Davies, *Quantum Mechanics*, Oxford; A. Beiser, *Concepts of Modern Physics*, McGraw-Hill.

3150B Modern Physics: lecture 3 hours, B.E. Paton. Prerequisite: Physics 3140A. Provides further application of the basic quantum mechanical principles presented in 3140A to topics in atomic, nuclear and solid state physics. Text: A. Beiser, *Concepts of Modern Physics*, McGraw-Hill.

3160A Topics in Physics: lecture 3 hours, M.H. Jericho. Prerequisite: At least one second-year level physics class. An introduction to thermodynamics, statistical mechanics, and other topics in classical physics.

- 3170B Topics in Physics:** lecture 3 hours, W.H. Jericho. Prerequisite: At least one second-year level physics class. This is complementary to 3160A. An introduction to optics and modern physics.
- 3200A Thermodynamics:** lecture 3 hours, B.L. Blackford. Prerequisite: Some knowledge of partial derivatives; Mathematics 2000, or its equivalent, which may be taken concurrently with the class. An introduction to the laws and basic concepts in classical thermodynamics. Topics include equations of state, heat engines, thermodynamic functions, and phase equilibria. Text: Zemansky and Dittman, *Heat and Thermodynamics*, 3rd ed.
- 3210B Statistical Mechanics:** lecture 3 hours, D.D. Betts. Prerequisites: Physics 3200A, or its equivalent; Mathematics 2000, or its equivalent. In this class the tools are developed to link the physical laws of the microscopic world, and the underlying atomic processes of the laws of thermodynamics are explored. Text: Kittel and Kroemer, *Thermal Physics*, 2nd Ed., Freeman.
- 3340A Electronics:** lecture 3 hours, H.W. Jones. Prerequisites: Physics 2120 or 2300A/2330B; Mathematics 2200 or 2000 or 2480A/2490B. Topics include: carrier transport in semiconductors, properties of diodes and transistors, amplifiers, oscillators, modulation, demodulation and rectification, operational amplifiers, linear and nonlinear analog systems. Text: Sedman and Weintraub, *Electronics*.
- 3350B Networks, Lines and Filters:** lecture 3 hours, H.W. Jones. Prerequisite: Physics 2120 or 2300A/2330B; Mathematics 2200 or 2000 or 2480A/2490B. Topics include: network reduction, the 4-terminal network and solution by matrix methods, properties of distributed constant transmission lines, active and passive filters. Text: Papoulis, *Circuits and Systems*.
- 3400* The Rise of Science and the Modern World:** lecture/seminar 2 hours, R. Ravindra (Physics), J. Farley (Biology). (Same as Biology 3400, History 3070 and Religion 3350. Class description to be found under Biology 3400.)
- 3440A/B Optics:** lecture 3 hours, C.K. Hoyt. Prerequisite: Physics 2300A/2330B, or Physics 2120, or Physics 2210B and Mathematics 2200. Topics are selected from areas such as the radiation from accelerated charges, the statistical properties of the fields from assemblies of radiators, interference, diffraction, and the application of Fourier transforms to the structure of images, the resolving power of instruments and the characterization of coherence. The students should be familiar with vector analysis, Maxwell's equations and the use of complex exponential functions. In any one year, only one of 3440A and 3440B will be given.
- 3810B Micro-Computers and the Real World:** lecture 3 hours, computer programming 1 hour, B.E. Paton. Prerequisite: Physics 2200A/2210B or 2110/2120. Subject material: measurement theory, modern sensors; micro-computer architecture; simple chip computers; software simulation of digital electronic circuits; machine language programming; assembly language programming; interfacing techniques; development of "intelligent" instruments. Text: Newell, *Introduction to Microcomputing*, 1982 Harper and Rowe.
- 4000B Advanced Lab:** lab 6 hours, W.H. Jericho. Prerequisite: Fourth-year standing in physics or engineering physics or permission from the instructor. This is a physics and engineering physics laboratory class in which students in groups of two work largely on their own initiative. The student may select experiments from the fields of optics, acoustics, solid state devices and low temperature physics. Detailed laboratory reports on the experiments are required and students are expected to demonstrate a good grasp of underlying physical principles.
- 4020B* Special Topics in the History and Philosophy of Science:** seminar 3 hours, R. Ravindra.
- 4080A Advanced Classical Mechanics:** lecture 3 hours, G.A. Cummins. Topics include the principle of least action, Lagrange's equation, Hamilton's equation, canonical transformations, Hamilton-Jacobi equation, motion of a rigid body, small oscillations. Text: Goldstein, *Classical Mechanics*, 2nd ed.
- 4100B Electrodynamics:** lecture 3 hours, S.T. Nugent. Topics include the wave equation and solutions, waves and metallic boundaries, the inhomogeneous wave equation, radiation from moving charges, scattering and dispersion. Text: Panofsky and Phillips, *Classical Electricity and Magnetism*.
- 4151A Quantum Mechanics:** lecture 3 hours, D. Kiang. Prerequisite: Physics 3140A.
- 4152B Quantum Mechanics:** lecture 3 hours, D. Kiang. Prerequisite: Physics 4151A. Topics discussed include: concepts and formulation of quantum mechanics, harmonic oscillator, angular momentum, the central force problem and approximation methods. Text: Liboff, *Introductory Quantum Mechanics*.
- 4160A Mathematical Methods of Physics:** lecture 3 hours, D.J.W. Gettart. Prerequisite: Mathematics 3110A/3120B or permission of the instructor. Topics discussed include: complex variable theory, Fourier and Laplace transform techniques, special functions, partial differential equations. Text: Lebedev, *Special Functions and Their Applications*; Arfken, *Mathematical Methods for Physicists*, Academic Press; L.M. Jones, *An Introduction to Mathematical Methods of Physics*, Benjamin Cummings.
- 4170B Topics in Mathematical Physics:** lecture 3 hours, D.J.W. Gettart. Prerequisite: Physics 4160A. This class is a continuation of Physics 4160A and deals with special topics in mathematical physics, such as the Green's function technique for solving ordinary and partial differential equations, scattering theory and phase shift analysis, diffraction theory, tensor analysis. Text: Lebedev, *Special Functions and Their Applications*.
- 4180A/B* Nuclear Physics:** lecture 3 hours, D. Kiang. Prerequisite: Physics 3140A. This is an introductory class. Topics discussed include: nucleon-nucleon interactions, nuclear structure, gamma transitions, alpha decay, beta decay and nuclear reactions. In any one year, only one of 4180A and 4180B is given.
- 4220A Microcomputer Based Instrumentation:** lecture 2 hours, lab 3 hours, B.E. Paton. Prerequisite: Physics 3810B. Subject material: instrument design; analog to digital and digital to analog techniques; custom interfacing to sensors; algorithms; parallel and serial output data links; software testing and debugging; hardware testing and debugging; research project. Text: Zaks, *Microcomputer Interfacing*.
- 4230A/B Introduction to Solid State Physics:** lecture 3 hours, D.A. Timball. Prerequisite: Physics 3140 or permission of the instructor. An introduction to the basic concepts of solid state physics which are related to the periodic nature of the crystalline lattice. Topics include crystal structure, X-ray diffraction, phonons and lattice vibrations, the free electron theory of metals, and energy bands. Text: Kittel, *Introduction to Solid State Physics*, 3rd Ed., Wiley.
- 4300A Applied Acoustics:** lecture 3 hours, H.W. Jones. Prerequisite: At least one class in Physics, beyond first-year level. These areas of acoustics are discussed as separate topics to serve the needs of students from different disciplines. The instruction is by guided reading, supplemented with a small number of general and introductory lectures, together with a limited series of specialised lectures related to each topic. The three topics are (i) physical acoustics for psychologists, (ii) ultrasonics and underwater acoustics, and (iii) physical acoustics allied to noise control, architectural and building acoustics and sound recording and reproduction. Text: Kinister and Frey, *Fundamentals of Acoustics*.

4311A/4312B Fluid Mechanics I/II: This class is a cross-listing for Oceanography 5311A/5312B and is accepted as a physics class.

4330A Physical Properties of Materials: lecture 3 hours, H.W. King. Prerequisite: Physics 3150B. The principles of solid state physics are applied to the study of materials. Physical properties have intrinsic symmetry which interacts with the symmetry of the crystal structure of the material, thereby defining the number of coefficients necessary to describe the property. Although solid state properties such as electron transport, magnetism, semiconductivity, superconductivity and the optical properties of dielectrics and semiconductors owe their existence to the quantum properties of electrons, the magnitude of these properties is strongly influenced by micro-structural effects such as solid solution alloying, crystal defects, grain boundaries, textures and plastic deformation. Text: Nye, *Physical Properties of Crystals*, Oxford Univ. Press, 1969.

4350B Energy, Sources and Conversion: lecture 3 hours, H.W. King. Prerequisites: Physics 3140A, 3150B, Engineering 340A. Topics discussed include: extent and use of world energy supplies, thermodynamics of heat engines, thermojunction generators and refrigerators, solar generators, thermionic generators, fuel cells and related devices, chemical primary and secondary cells, magnetohydrodynamics, nuclear fission processes, and breeder reactors. Text: Angrist, *Direct Energy Conversion*.

4460A/B* Optics: lecture 3 hours, C.K. Hoyt. Prerequisite: Physics 3440A/B. Registration requires prior Departmental consent. A continuation of Physics 3440A/B dealing with coherence, polarization, scattering by matter, the electromagnetic properties of matter, including crystals, reflection, refraction and double refraction. In any given year, only one of 4460A and 4460B will be offered.

4480A Applied Group Theory: lecture 3 hours. Offered in alternate years beginning in 1979-80. This is cross-listed with Mathematics 3320A, but for students in Physics 4480A, additional reading will be required.

4500A Atmospheric Physics I: lecture 3 hours, D.F. Goble. Prerequisite: At least one third-year level physics class. Main topics covered in this class are atmospheric thermodynamics and atmospheric radiation. Reference: J.V. Iribarne and W.L. Godson, *Atmospheric Thermodynamics*, Reidel; G.J. Haltinev and F.L. Martin, *Dynamic and Physical Meteorology*, McGraw-Hill.

4510B Atmospheric Physics II: lecture 3 hours, D.F. Goble. Prerequisite: Physics 4500A. The major topic covered in this class is cloud physics. Other topics include atmospheric optics, atmospheric acoustics, lightning, and radar techniques. Reference: R.R. Rogers, *A Short Course in Cloud Physics*, Pergamon; J. Battan, *Radar Observation of the Atmosphere*, U. of Chicago Press; *Atmospheric Physics*, Readings from Scientific American, Freeman.

4520A General Meteorology I: lecture 3 hours, staff. Prerequisite: At least one third-year level physics class. This class provides students with an understanding of the origin and composition of the atmosphere, its thermal structure, the general circulation, air mass and frontal theory, weather generating physical processes and their consequences. Text: J.W. Wallace and P.V. Hobbs, *Atmospheric Science (An Introductory Survey)*, Academic Press.

4530B General Meteorology II: lecture 3 hours, staff. Prerequisite: Physics 4520A. This class expands on knowledge acquired in 4520A. Topics studied include hydrostatic stability and instability micro-scale phenomena, local wind systems, controls on weather and climate. Students are exposed to applications of meteorological knowledge and theory of problems in air pollution control, hydrology, agriculture and other fields. Text: J.W. Wallace and P.V. Hobbs, *Atmospheric Science (An Introductory Survey)*, Academic Press.

4540A Synoptic Meteorology I: lecture 2 hours, tutorial and laboratory 3 hours, staff. Prerequisite: At least one third-year level physics class. This class introduces principles and techniques of meteorological analysis, diagnosis of weather systems and prognosis of system motion and development. A brief review is presented of meteorological instrumentation, observational procedures, codes and analysis techniques, essential to the study of the main subject matter. The class includes a weekly three-hour tutorial-laboratory period during which graphical and computer methods are applied to the examination of real atmospheric systems.

4550B Synoptic Meteorology II: lecture 2 hours, tutorial and laboratory 3 hours, staff. Prerequisite: Physics 4540A. This class extends the analysis and diagnosis of atmospheric dynamics and weather processes introduced in Physics 4540A. Modern statistical and computer methods and satellite techniques are discussed. The class includes a weekly three-hour tutorial-laboratory period during which case studies of atmospheric systems and processes are carried out.

4650A/4660B Relativity and Cosmology: lecture and tutorials 3 hours, staff. Offered in alternate years, beginning in 1980-81. Prerequisites: Physics 2110 and 2120, Mathematics 3110A and 3120B, or the consent of the instructor. An introduction to both the theoretical and observational basis of modern physical cosmology. The first half is devoted to the development of the 4-vector formalism for the Special and the General theories of Relativity. Einstein's field equations are developed and some realistic cosmological models, based on these equations, are discussed. The emphasis is on intuitive and physical insight rather than mathematical rigour. The second half is devoted to understanding available observational data in cosmology in the light of previously developed theory. In addition to solving regularly assigned problems, each student makes a departmental presentation towards the end of the year concerning the latest developments in a topic of choice, such as "black holes," "age of the universe," or "primordial radiation."

8890 Co-op 2nd Year Seminar: (non-credit).

8891 Co-op Work Term I

8892 Co-op Work Term II

8893 Co-op Work Term III

8894 Co-op Work Term IV

Graduate Studies

The Department of Physics provides courses of study leading to the advanced degrees of MSc and PhD. Areas of research undertaken at Dalhousie include: solid state, geophysics, low energy nuclear physics, low temperature, theoretical physics, and oceanography. Further details are given in the Calendar of the Faculty of Graduate Studies.

Political Science

Chairperson of Department
D.W. Stairs

Professors Emeritus

J.H. Aitchison, BA, BEd (Sask.), BSc (Lond.), PhD (Tor.)
J.M. Beck, MA (Acadia), MA, PhD (Tor.), FRSC
G. Grant, BA (Queen's), DPhil (Oxon), LLD (Trent), DLit (MtA), LLD (Dal)
LLD (Tor.), FRSC

Professors

P.C. Aucoin, BA (SMU), MA (Dal), PhD (Queen's)
R. Boardman, BSc, PhD (Lond.) (*Director, Centre for Foreign Policy Studies*)
E.M. Borgese (Professor of International Ocean Affairs)
D. Braybrooke, BA (Harv.), MA, PhD (Corn.), FRSC
D.M. Cameron, BA (Queen's), MA, PhilM, PhD (Tor.)
J.G. Eayrs, BA (Tor.), AM, PhD (Col.), FRSC (Eric Dennis Memorial Professor
of Government and Political Science)
K.A. Heard, BA, MA, PhD (Natal)
P. Pross, BA, MA (Queen's), PhD (Tor.)
T.M. Shaw, BA (Sussex), MA (Prin., East Africa), PhD (Prin.)
D.W. Stairs, BA (Dal), MA (Oxon.), PhD (Tor.), FRSC
G.R. Winham, BA (Bowdoin), Dip. in Int. Laws (Manc.), PhD (N.Car.)

Associate Professors

H. Bakvis, BA (Hons) (Queen's), MA, PhD (UBC)
R.L. Dial, BA (U. of Calif. Santa Barbara), MA, PhD (U. Calif. Berkeley)
R. Eden, BA (U. Calif. Berkeley), PhD (Harv.)
D.W. Middlemiss, BA, MA, PhD (Tor.)
D.J. Munton, BA, MA (UBC), PhD (Ohio State)
D.H. Poel, BA (Calvin), MA (West Michigan), PhD (Iowa)

Assistant Professor

J. Smith, BA (McM), MA, PhD (Dal)

Assistant Professor (Research)

J. Sokolsky, BA (Hons) (Univ. of Toronto), MA (SAIS), PhD (Harvard)

Adjunct Professor

S.K. Holloway, BA, MA, PhD (Ohio State)
H. Silverstein, BA (Wisc.), MA, PhD (Graduate School of International Studies, Denver)

"Politics: Who Gets What, When, How" is a definition which captures what is commonly regarded as the essence of politics, and suggests a large part of what political scientists are trying to find out, with varying interests and methods. In pursuit of answers to fundamental questions, political scientists investigate a variety of political problems, whether in one country or compared amongst several. The variety of political science questions is endless.

Attention can be focused more narrowly on the "policy machine," on international politics where the origins and conduct of the foreign policies of particular states are examined, or on the exercise of power within the nation state.

The emphasis in these various political science pursuits is on the study of politics as actually practised in the world around us. But many political scientists would agree that this is only a first step, and that we should also address ourselves to questions having to do with how politics ought to be. Issues of this sort have been debated by reflective men for thousands of years without easy answers. To consider these sorts of questions is the

principal task of political philosophy, which lies at the core of political studies, and of political life.

Students interested in these various fields of inquiry within the discipline of Political Science can find all of them represented in the class offerings and programs outlined below. Some specialize, others pursue interests in a number of different areas. In either case, the members of the Department are happy to offer whatever advice and assistance they can in the development of any student's personal program of studies.

Degree Programs

Students concentrating in Political Science may take a major program or honours program. The specific classes to be taken in each individual program are chosen in consultation with a faculty adviser from the Department in accordance with the general requirements listed below. Undergraduate programs may emphasize one of the subfields of Political Science or may consist of a general selection of classes from the Department's offerings.

Requirements — Major Program

In order to meet the requirements of a major program, a student must take at least four, but no more than eight, classes in political science in addition to an introductory class. All major students should take at least two full classes from among the second-year level offerings and these classes should be selected from at least two sub-fields. A minimum of two additional classes should be taken from third-year level offerings, and will be chosen in consultation with the faculty. Professor J. Smith is the Departmental Coordinator for Major Programs and is happy to assist students in planning programs in Political Science.

Honours Program

An honours program normally consists of a first-year level class and not less than nine nor more than eleven additional classes in Political Science. Although nine to eleven classes represents the range allowed under the general university regulations, the Department recommends quite strongly that the normal honours program consist of nine classes past the first-year class, including the honours essay. The intent of this recommendation is to encourage our honours students to take supporting class work in related disciplines.

For the purpose of the honours program the Department has designated six second-year classes as honours core classes. Five of these core classes represent the political science sub-fields of Canadian politics, comparative politics, political philosophy (two classes) and international politics and the fifth represents the methodological basis for each of the subfields. The six core classes by area are as follows:

Canadian politics: PS 2200R Canadian Government and Politics
Comparative politics: PS 2300R Comparative Politics
Political philosophy: PS 2400 Justice, Law and Morality: Regimes
Version
Political philosophy: PS 2401 Justice, Law and Morality: Concepts
Version
International philosophy: PS 2500 World Politics
Methodology: PS 2494 Introduction to Political Inquiry

An honours program in political science includes (i) at least three core classes, of which one must be PS 2494 Introduction to Political Inquiry, and another must be *either* PS 2400 *or* PS 2401; (ii) at least four advanced classes at the third and/or fourth year level, including the honours essay.

The core class requirements are designed (1) to give breadth to the honours program, (2) to provide all honours students with a grounding in the normative questions of the discipline as well as the foundations of empirical inquiry, and (3) to expose prospective honours students to the various sub-fields that may be chosen for emphasis in individual programs. Overall, these requirements leave a minimum of two optional credits, which may be taken at the second, third or fourth-year levels.

In the exceptional case of students who have delayed their decision to enroll in an honours program until late in their third year, or who have decided at the end of their general program to pursue an Honours Certificate, third-year or higher level classes may be substituted on occasion for one or more of the core classes. Such substitutions, however, must reflect the same distribution of sub-fields within the discipline as is specified by the core-class requirement, and they must have the approval of the Honours Supervisor. Students who think they may eventually pursue an honours degree or certificate are strongly advised to complete their core-class requirements as early in their undergraduate careers as possible.

The honours essay is counted as one credit. It is prepared during the fourth year under the supervision of a faculty member. The essay shows the student's ability to develop a systematic argument with reference to pertinent literature and other such data or analytical materials as may be appropriate. The credit number for the honours essay is PS 4600. Informal arrangements are usually made for honours students in the last year to meet with some regularity to discuss and ultimately present the work represented in their essay. A guide for preparing the honours essay is available from the Department Office.

Combined Honours

Several of the more common honours programs are: Political Science and Philosophy; Political Science and History; Political Science and Economics; Political Science and Sociology. Students interested in taking any of these combined honours programs or in discussing other possible programs should consult with the Chairman of the Department or his deputy.

Graduate Studies

The Department offers MA and PhD programs in Political Science, details of which are given in the Calendar of the Faculty of Graduate Studies.

Undergraduate Advisory System

The advisory system in the Department of Political Science is intended to assist students in designing a specific program in accordance with their interests and the requirements of the Department. Professor J. Smith is the over-all Coordinator of Major Programs and is assisted by other Departmental members acting as general advisers.

Selection: A student wishing to have a member of the Political Science Department as undergraduate adviser must be either: (a) enrolled in a first-year level class and contemplating a Program in Political Science (in which case the adviser is normally the instructor of that class) or (b) registered for a program in Political Science. Upon entering the program a student may indicate a choice of adviser. Normally the adviser is a faculty member teaching in the student's sub-fields of concentration (if any). The student's choice will be respected unless the member chosen is unable to serve in this capacity. Students who have no preference, but would like nonetheless to have an adviser assigned to them, should consult with Professor Smith.

The advisory relationship may be ended by the student at any time and for any reason. One faculty member may continue to advise the same student throughout his program.

Role of the Adviser: To be available to the student throughout the year as a consultant on broad academic matters. The adviser is not a tutor with regard to specific classes. Students should consult their advisers with regard to the general structure of their programs and any proposed course changes.

Classes Offered

Numbering System for Classes

Class descriptions are listed by four-digit numbers under headings:

Introductory
Canadian Government and Politics
Comparative Government and Politics
Political Theory and Methodology
International Politics and Foreign Policy

The first digit of each class number thus indicates year, or level, of class. Except for 1000-level classes, the second digit denotes the sub-field within which the class is listed. Thus PS 3540B/5540B is a class open to third-year level and graduate students, in the sub-field International Politics and Foreign Policy, offered during the second term of the academic year.

No student may take more than one first-year level class but some second-year level classes require no prerequisite. The prerequisites listed with each class are intended to show the sort of preparation the instructor anticipates. If no prerequisite is stated for a class, none is required. Admission to classes at and above the third-year level is at the discretion of the instructor who retains the right to judge the suitability of each prospective student's qualifications for the successful completion of the class and his contributions to it.

Introductory

1100 Section 1, Introduction to Political Science: lecture 3 hours, K.A. Heard. "Why obey the law?" "Are governments subject to moral restraints?" These are examples of questions discussed in class as an informal introduction to political philosophy. As a bridge between the study of political philosophy and the study of political institutions, the theories and principles of democracy are examined, with references to British political experience. More detailed examination of the constitutions and government of the United States and Canada occupy the remainder (about half) of the session.

1100 Section 2, Introduction to Political Science: lecture 3 hours, D. Braybooke. This class works through two outstanding recent contributions to political science. *Size and Democracy*, by R.A. Dahl and E.R. Tufte; and *Politics and Markets*, by C.E. Lindblom. These books serve to introduce students, not only to some current grand issues in politics, including the opposition of capitalism to socialism, but also to several branches of political science, and the methods used in them.

1101 Section 1, Introduction to International Politics and Foreign Policy: lecture and intended discussion 3 hours, J. Eayrs. To provide a framework for analysis and understanding of contemporary international events, this class deals with the variety of "actors" in world politics (principally but not exclusively states), and examines some concepts in the field. 1101 is recommended for students planning to take 2500, in their second year.

1103 Section 1, Introduction to Political Science: lecture and discussion 3 hours, R. Boardman. A guide to politics and government in Canada and the United States. Aspects of British, Soviet and other countries' political systems are introduced, and the class begins with a look at some of the perennial issues of political life and democracy.

1103 Section 2, Introduction to Political Science: lecture and discussion 3 hours, R.L. Dial. A comparative study of the institutions, processes, and problems of government in western democracies. Attention is paid mainly, but not exclusively, to the political systems of Great Britain, Canada, and the United States, with emphasis on Canada.

Canadian Government and Politics

2200 Canadian Government and Politics: lecture 3 hours, J. Smith. Prerequisite: An introductory political science class or instructor's permission. The class begins by examining the Confederation debate, 1864-67, and then turns to the constitution of the new federation, the British North America Act. Its development via constitutional amendment and the practice of judicial review is studied. A review of the Canada Act, 1982, completes this section of the course. The second section deals with governmental institutions, the Crown, cabinet government and Parliament. The third and final section covers elections, the electoral system and political parties.

2228B Government-Business Relations in Canada: lecture and discussion 2 hours; H. Bakvis. Prerequisite: An introductory political science class, or instructor's permission. The aim of this class is to explore the interaction

between business and government in Canada and, more generally, the role of government in economic life. The objectives are to introduce students to the policy instruments deployed by governments to promote and regulate business activities in a market economy; the political values and interests which pertain to such promotion and regulation; and the manner in which the private sector seeks to affect the formulation and implementation of government policy. The class is of interest to Commerce and other students not majoring in political science since many of the topics are approached with a view to their practical importance.

2250 Introduction to Public Administration: Managing the Public Sector: lecture and discussion 3 hours, A.P. Pross. Today's governments depend on complex organizational machinery to develop policy and to deliver the many services the public requires. This class studies that machinery: how it is built; how it works; how it relates to people, both employees and clients; how it uses different kinds of resources and, above all, how it influences the making of government policy. The principal focus of the class is on the management of Canadian government but comparative material from other Western countries is used frequently.

3204/5204 The Politics, Government and Constitution of Canada: seminar 2 hours, J. Smith. Prerequisite: PS 2200 or its equivalent with second class standing, or in exceptional circumstances, those with high standing in PS 1100, and instructor's permission. This seminar class examines in some depth important political and constitutional questions in Canada. These include constitutional amendment and the practice of judicial review, cabinet government and the role of Parliament, the electoral system, and political parties. Considerable emphasis is placed on historical investigation and analysis.

3205B/5205B Canadian Political Thought: seminar 2 hours, J. Smith. Prerequisites: Class in Canadian Politics or permission of the instructor. The class examines enduring controversies in Canadian politics as these have been presented in well known speeches, pamphlets and articles by people active in public life. It begins by looking at the Confederation debate, 1864-67, paying particular attention to the farmers' concept of federalism and parliamentary as opposed to republican government. It concludes with the debate on these issues that culminated in the 1982 amendments to the constitution.

3208/5208 Canadian Provincial Politics: lecture and seminar 2 hours, D.H. Poel.* Prerequisite: PS 2200. An emphasis on cross provincial, empirical research is combined with an interest in the value context of provincial policy. Primary class goals are (1) to stimulate enough interest in provincial politics to develop evaluation research questions and (2) to provide sufficient research skills to permit successful participation in the annual program evaluation project which is undertaken by the class as a whole.

3212B/5212B The Politics and Government of Nova Scotia: seminar 2 hours, P.C. Aucoin.* Prerequisite: Political Science 1100 or its equivalent. The work of the first term consists of a detailed examination of the Nova Scotian political process since Confederation. In the second term research papers prepared by the class form the basis for analyzing and appraising the functioning of Nova Scotian political institutions. Some time is devoted to federal-Nova Scotian relations. Special attention is paid to the political culture of the province and its effect on the general character of Nova Scotian politics.

3216A/5216A Local and Regional Government: seminar 2 hours, D.M. Cameron.* (Open to graduate and senior undergraduate students.) The development, organization and operation, and the present legal and fiscal positions of various forms of local and regional government in Canada. Special attention is paid to the city manager system, to the reform of local government, to the special problems of metropolitan government, and to the reliance on special purpose boards and commissions.

3220A/5220A Intergovernmental Relations in Canada: seminar 2 hours, H. Bakvis. Prerequisite: PS 2200 or permission of the instructor. A number of topics concerning the territorial division of political power and the relations that have developed between governments are considered.

3221B/5221B Case Studies in Intergovernmental Relations: seminar 2 hours, D.M. Cameron.* Prerequisite: PS 3220A/5220A or PS 3204. Building on the foundations established in 3220A/5220A, we explore in depth one or several case studies involving relations between governments in Canada. The selection of cases is made at the conclusion of the first term, attempting to accommodate the interests of students as well as taking account of the availability of literature. Students present and defend one or more seminar papers.

3224A/5224A Canadian Political Parties: lecture and discussion 3 hours, H. Bakvis.* Prerequisite: PS 2200 or instructor's permission. The Canadian party system, viewed as an integral part of the entire political system, presents a number of interesting questions for exploration.

3226B/5226B Pressure Group Politics: seminar 2 hours, A.P. Pross.* Prerequisite: An introductory class in political science and a class in Canadian government. Otherwise with the special permission of the instructor. This class attempts a systematic examination of pressure group politics in Canada and other western countries. It begins by considering the functions pressure groups perform in political systems and then explores the ways in which their structures and behaviour patterns vary across those systems. That discussion leads into an examination of the role of pressure groups in policy processes and, finally, of the relationship between that role and the prospects for democracy in western politics.

4240/5240 Sections 1 and 2, Policy Formulation in Canada: seminar 2 hours, P. Brown. Prerequisite: Intended for 4th-year Honours students, others with instructor's permission. A comprehensive examination of the three critical questions in the study of policy formulation in Canada: 1. The function of the state; 2. The question of why governments develop policies in these areas; and 3. The means by which governments authoritatively develop policies. The discussion links these variables with a macro level analysis of the scholarly approach to decision-making. The emergence of tension resulting from the development of superindustrial society and from regionalism in the Canadian community provides policy problems on which the general theoretical analysis is hinged.

4242B/5242B Science Policy in Canada: seminar 2 hours, P.C. Aucoin.*

4243B/5243B Health Care Policy in Canada: seminar 2 hours, P.C. Aucoin.* Prerequisite: PS 2200 or 3250 or equivalent classes in Canadian government and public policy. The policies of Canadian governments for the delivery of health care are studied in terms of the roles of the health professions and governmental structures in their formulation and administration. Special attention is given to the process of intergovernmental relations in this policy field and the increasing politicization of health care delivery.

4245B/5245B Urban Policy in Canada: seminar 2 hours, D.M. Cameron.*

4249 Public Policy in the 80's: seminar 2 hours, staff (same as Econ. 4000). The discussion centres on the problems of formulating and carrying out economic policy in Canada. Recent budget addresses; industrial policy and tax and expenditure policies are reviewed. Other topics include Canada's reliance on resource exports and capital imports; issues raised by multinational corporations and their consequences for political sovereignty. The choice of a balanced economy or export specialization is examined. The approach is interdisciplinary.

POLITICAL SCIENCE

4266A/5266A Natural Resource Administration in Canada: seminar 2 hours, A.P. Pross.* Prerequisite: PS 2200 or 4240 or permission of the instructor. The formulation and administration of natural resource policies in Canada are examined with attention to renewable natural resources and a focus on Eastern Canada.

Comparative Government and Politics

2300 Comparative Politics: lecture 2 hours, R. Boardman.* Prerequisite: An introductory political science class, or instructor's permission. The methodology and scope of comparative politics, including a comparative analysis of culture, behaviour, and institutions. Topics are approached through studies of a variety of Western liberal democratic, communist, and third world countries.

2305 European Comparative Politics: lecture and discussion 2 hours, R. Boardman.* Prerequisite: An introductory political science class, or instructor's permission. Emphasis is on the three major western countries - France, West Germany and Britain. The political life of other countries is also investigated depending on available time and student interest. Students specializing in comparative politics and students of one or more European languages who are attracted to the study of Europe for other reasons form the intended audience.

2321 Political Behaviour: lecture and discussion 2 hours, D.H. Poel.* Prerequisite: An introductory political science class or instructor's permission. How individuals gather information about, form general orientations toward, and learn to participate (or not to participate) in the polity. Research methods used in analyzing political behaviour form an important secondary consideration.

2330 Politics Through Literature: lecture and discussion 2 hours, R. Dial.* (not restricted to Political Science majors) What is suggested by *Through* is a notion that literature is a "medium" for political understanding or explanation and political learning. During the first term we use a variety of fictional works to dissect key political concepts. In the second term we isolate within literature explanatory theories of complex political situations.

2370 U.S. Government and Politics: lecture and discussion 3 hours, D.H. Poel. Prerequisite: An introductory political science class, or instructor's permission. The class provides a survey of American political institutions, public policies, and public participation in politics. The presidency, Congress and bureaucracy are examined along with the interplay of private interest groups and the role of political parties. Course assignments allow students to pursue individual interests in American politics or public policy.

3301B/5301B Comparative Analysis: seminar 2 hours, R. Boardman and D. Poel.* Prerequisite: Open to senior undergraduates with instructor's permission. The epistemological and methodological questions in the field of comparative politics are examined using several classification schemes for political institutions and behaviour, to ascertain whether comparative analysis can make good a claim to be "scientific." The class is recommended for graduate and honours students.

3303B/5303B Human Rights and Politics: lecture and discussion 2 hours, K.A. Heard. Prerequisites: PS 1100 or 1103 and, preferably, PS 2300, PS 2305; PS 2400 or PS 2401; or with the permission of the instructor. Issues arising from the claim to rights and from alleged infractions of rights which continue to arouse a great deal of public controversy within individual states and also within the international community are examined by type and by the bases of the claims to such rights. The approach is comparative, and students undertake case studies relating to the general topics.

3304B/5304B Comparative Federalism: seminar 2 hours, H. Bakvis.* A seminar class which examines the theory and practice of federalism within

a comparative framework. The actual federations discussed depends in part on student interest but usually includes both established federal nations and those moving in that direction.

3315B/5315B African Politics: seminar 2 hours, T.M. Shaw. (Intended for students in African Studies and Political Science and can be matched with Political Science 3540A on the Foreign Policies of African States.) The political economies of several black African states are analysed focussing on the elusiveness of independence and development, examining the variety of responses to the problems of dependence and underdevelopment. Although the concentration is on the countries of east and west Africa, its investigation of several characteristic African phenomena constitutes a general introduction to African government.

3331A/5331A Political Problems in Imaginative Literature: seminar 2 hours, R.L. Dial.* The imaginative literature of politics, in contrast to the empirical approach, has highlighted the tragic element of political life. One source of the not-so-rare tragic dimension of politics is the attempt to allocate values across cultural systems. This term the class explores the phenomenon of inter-cultural politics in a variety of settings, both historical and contemporary. Political Science 2330, though not a prerequisite, would be desirable background.

3340A/5340A Problems of Development — The Politics of New States: discussion and seminar 2 hours, T. Shaw.* A survey of theories of and policies about dependence, underdevelopment and peripheral social formations. Particular emphasis on modernisation and materialist modes of analysis, and on orthodox and radical strategies of development. Topics treated include social contradictions (e.g., class, race and ethnicity); industrialisation; self-reliance; Basic Human Needs; ideology, militarism; technology; gender, anarchy; authoritarianism; and decay.

3345A/5345A South Africa — The Dynamics of Political Groups and Group Domination: seminar 2 hours, K.A. Heard. Prerequisites: An introductory political science class or instructor's permission. The class begins with a preliminary discussion of what constitutes a political group, and how and why some groups seek to dominate others. It then examines the modes of White domination in South Africa, the causes of its persistence and the reactions of the subordinate Black peoples of South Africa.

3357A/5357A Chinese Politics — Domestic: seminar 2 hours, R.L. Dial.* The various dimensions of the Chinese political process since 1949 are dealt with.

3370/5370 The Theory and Practice of Government in the United States: lecture and discussion 3 hours, staff.* Among the themes given special attention are the role of the judiciary and the centralization of authority in the United States.

Political Theory and Methodology

2400 Justice, Law and Morality, Regimes Version — The Problem of Regimes in Political Philosophy: lecture 2 hours, R. Eden, (same as Phil. 2270). This introduction to political philosophy explores the problem of the best regime. Questioning how the media shape our opinions, we discover the problem of the tyranny of the majority. Tocqueville argued that democracy would become a subtle form of Hobbesist tyranny if individualism were not checked. We will trace the origins of this problem to Machiavelli, Hobbes, and Montesquieu and ask why Tocqueville rejected Rousseau's alternative to bourgeois civil society. Finally we consider the alternative to democracy proposed by Plato and Aristotle. N.B: This class is complementary to the other version of Justice, Law and Morality. It may be taken for credit before, after, or concurrently with the other class (except that students who took Philosophy 2070 or Political Science 2400 before the academic year 1983-84 must satisfy the instructor that they have not already had the version in question). Either class satisfies the minimum requirement in political philosophy for an honours degree in Political Science.

- 2401 Justice, Law and Morality, Concepts Version — Concepts and Arguments in Political Philosophy:** lecture 2 hours, D. Braybrooke, (same as Phil. 2070). An introduction to the history of political philosophy, and also to philosophical ethics. In the first term, the natural law view of justice expressed by St. Thomas confronts the savage realism of Hobbes's *Leviathan*. The concept of justice has had a mixed career since Hobbes's time. In Locke's and Hume's doctrines it is narrowly tied to the defense of property. Sometimes, as with Bentham and Mill, it has appeared redundant; and Marx held that it would be superseded. In our own time, a major effort has been made by John Rawls to restore justice to the central place in ethics. His theory is considered at length at the end of the second term, after examining Lon Fuller's equally contemporary account of the extent to which law must be moral to be genuine.
- 2402 Representative Government in Theory and Practice:** lecture and discussion 3 hours, R. Eden.* Hamilton pointed out that the science of representative government is a modern discovery from which many of our institutions, and indeed our modern forms of government in general, are derived. In this class we try to recover this science, reconsidering achievements in practice.
- 2455A/5455A Marxist Theory and Its Upshot in the Modern World:** seminar 2 hours, S.A.M. Burns. Prerequisite: A class in Philosophy or a class in Political Science. Marxist theory, both as philosophy and as social science, is examined with special emphasis on major writings of Karl Marx.
- 2494 Introduction to Political Inquiry:** lecture and discussion 3 hours, staff.* A variety of methods employed in contemporary political analysis to explain political events are analysed critically, including consideration of the general question of the requirements of explanation in political science. Casual explanation and problems in the development and verification of social scientific theory are emphasized. A particular substantive issue unifies discussion of the various methods of explanation and a research project in that issue permits the use of some of the tools of analysis discussed in connection with social scientific theory.
- 3410/5410 Man, Society and Politics — the Concept of Community:** seminar 3 hours, staff.*
- 3430A/5430A The Political Philosophy of Plato:** seminar 2 hours, R. Eden.*
- 3435A/5435A Machiavellian Politics:** seminar 2 hours, R. Eden.* This seminar explores Machiavelli's contributions to modern politics and political science.
- 3438B/5438B Rousseau and the Founding of Modern Democracy:** seminar 2 hours, R. Eden.* The origins of modern democracy are explored through a study of Rousseau's political philosophy. Attention is given to Rousseau's defense of democracy against earlier critics, and to his understanding of the founding of a democratic society. Seminar participation constitutes part of the grade.
- 3451A/5451A The Critique of Democracy in Modern Political Philosophy:** lecture and seminar 3 hours, R. Eden.* An introduction for citizens who wish to reflect critically on the character of representative government, on liberal democracy, and on the kind of commercial republic in which we live in North America, using the works of Montesquieu (who defended the commercial republic) and Nietzsche (who attacked it).
- 3470B/5470B Futurology and Politics:** seminar 2 hours, D. Munton.*
- 3497A/5497A Research Methods and Data Analysis:** seminar 2 hours, staff.* A broad, non-technical introduction to the assumptions, procedures, and problems of empirical investigation in political science. The five major stages common to all such research are explored using substantive readings from various sub-fields of the discipline. The major assignment in the class is a research project of the student's own choice and design. A background in statistics or computer programming is unnecessary.
- 4479B/5479B Classical Liberalism, and Democracy:** (seminar in Philosophy, Politics and Economics) 2 hours, second term, D. Braybrooke. (Same as Phil. 4470B/5470B and Econ. 446B/547B.) Prerequisites: Previous classes in all three subjects or an advanced undergraduate level in at least one of them. Students taking the class for a credit in philosophy should have had a class in logic (2000 or 2010 or 2020) and one in ethics (3100); students taking the class for a credit in political science should have had at least one 3000-level class in political science; students taking the class for credit in economics should have had at least one 330-level class in that subject. The impact on political philosophy of two leading beliefs characteristic of classical liberalism is covered: first, the belief that good government is strictly limited government; and second, the belief that there is no standard of personal welfare, or of the common good, beyond personal preferences and points on which the preferences of different persons agree.
- 4480A/5480A Social Choice Theory:** (seminar in Philosophy, Politics and Economics) 2 hours, first term, D. Braybrooke.* (Same as Phil. 4480A/5480A and Econ. 448A/548A.) Prerequisites: The same as for PS 4479B/5479B. Kenneth Arrow's Nobel Prize winning theorem, to the effect that no device of social choice meets an apparently minimal set of weak standards, has seemed to lead two traditions of thought to ruin. One is the theory of voting. The other is welfare economics. After tracing the two traditions that converge in Arrow's theorem, we study the theorem itself and then consider the continuing disarray into which formal social choice theory (and hence the basic theory of democracy) has been thrown by the theorem.
- 4485B/5485B The Theory of Games as an Approach to the Foundations of Ethics and Politics:** (seminar in Philosophy, Politics and Economics) 2 hours, spring term, D. Braybrooke.* The most innovative recent work in ethical theory has applied the theory of games to the perennial problem of the social contract. To what extent can any organized society to which people freely adhere be represented as constituted by rules arrived at by rational agents trying each to arrive at the best bargain about rules with the other agents present? These rules can be regarded simultaneously as the foundation of political organization and as elementary rules of ethics, and a study of this topic forms the basis of the class.
- 4490B/5490B The Logic of Questions, Policy Analysis and Issue Processing:** (seminar in Philosophy, Politics, and Economics) 2 hours, spring term, D. Braybrooke.* (Same as Econ. 449B/549B and Phil. 4490B/5490B.)
- 4495B/5495B Problems of Quantification:** seminar 2 hours, staff.* Attention is given to the theoretical foundations of social enquiry, with concentration where possible upon social indicators, and students engage in computer analysis of a small data set, to gain some facility in interpreting statistics to result in a major paper from student's work in either of the two streams.
- 4496A/5496A Philosophy of the Social Sciences:** seminar 2 hours, T. Vinci. Prerequisites: A class in research methods or political behaviour and a class in philosophy; or instructor's permission. A number of philosophers have challenged the application in the social sciences and history of the methods, quantitative and otherwise, used in the natural sciences. The challengers hold that in the study of man and society, different methods are suitable. The extent to which this view rightly calls attention to an important non-quantitative branch of social inquiry is established. The relationship between this branch and the branch or branches of social inquiry in which the example of the natural sciences can be followed is worked out.
- International Politics and Foreign Policy**
2500 World Politics: lecture and discussion 2 hours, J.G. Eayrs. A conti-

uation of 1101, this class examines techniques of statecraft, surveys the "assaults" upon order, justice and well-being of which the actors of world politics are capable, and explores the available "constraints" upon such actions afforded by international systems and methods. 2500 is recommended for students who have taken 1101 in their first year.

2505 International Politics in the Post-War World: lecture and discussion 3 hours, D.W. Stairs.* Prerequisite: An introductory class in political science or instructor's permission. A survey of international politics since World War II with emphasis on politicosecurity issues. Attention is on identifying alternative explanations for these phenomena, which explain issues, and to showing how they are related to different theoretical premises about the nature of international politics and to the kinds of prescriptive remedies that often result.

2510 Canadian External Relations: lecture and discussion 3 hours, D.W. Stairs. Prerequisite: An introductory class in political science or instructor's permission. A general survey of Canadian foreign and defence policies and of the processes by which these policies are made. Some of the persistent pressures and constraints which Canadian policy makers are forced to take into account are examined.

3531A/5531A The United Nations in World Politics: seminar 2 hours, T.M. Shaw.* Prerequisite: A class in international politics or with the instructor's permission. The evolution of the United Nations from its early concentration on problems of collective security, through the period of preventive diplomacy and anti-colonialism, to its present role as a forum for the aspirations and demands of the Less Developed Countries is reviewed. The more distant future, and the continuing relevance of the United Nations in world politics, and how its role and objectives should be determined, are considered.

3535B/5535B Towards a New World Order: seminar 2 hours, G. Winham.* Progress towards, and the elusiveness of, a new world order is described, analysed, and explained. The demands for, and responses to, change in international politics, economics, society and norms are examined. Normative as well as analytic problems are concentrated upon. An advanced class in international politics which requires a concern with, and awareness of, global issues, which is attractive to students of international economics, society and history or with a familiarity with Third World states and problems.

3540A/5540A Foreign Policies of African States: discussion and seminar 2 hours, T.M. Shaw. An overview of modes and levels of analysis for Africa and of salient cases from that continent; a survey of issues (e.g., intervention, integration, conflict, development, diplomacy, futures) and of examples (e.g., Botswana, Nigeria, Senegal, Tanzania, Zaire and Zimbabwe). Students concentrating on international relations, development studies, or African politics find that this class fits their programs.

3544B/5544B Conflict and Cooperation in Southern Africa: lecture and seminar 2 hours, T.M. Shaw.* An introduction to the international relations of Southern Africa, which provides a study of regional political economy with both empirical and theoretical significance. The primary focus is on regional conflict and integration, especially on the liberation movements and regional coalitions.

3570/5570 Canadian Foreign Policy: seminar 2 hours, D.W. Middlemiss. Prerequisite: A class in international politics, modern Canadian history, or with the instructor's permission. The seminar examines post-World War II Canadian foreign policy in three parts: detailed analysis 1. A detailed analysis of major policy developments using the case study approach. 2. An investigation of selected contemporary themes, issues, and problems. 3. A broad analytical overview of factors which help "explain" the form and content of Canadian policy.

3571/5571 Strategy and Canadian Defence Policy: seminar 2 hours, D.W. Middlemiss. Prerequisite: A class in international relations, or the instructor's permission. This seminar examines post-World War II Canadian defence policy in three parts: 1) An analysis of important cases of policy development. 2) An investigation of certain persistent themes and current issues (e.g. Canada-U.S. defence relations; defence funding; weapons procurement; the role of women in the forces; civil-military relations, etc.). 3. An assessment of the major determinants of policy and prescriptions for the future.

3572/5572 American Foreign Policy: seminar 2 hours, G. Winham. Prerequisite: A class in American politics, American history, or international politics, or the instructor's permission. Why Americans make the kind of foreign policy they do and the decision process and relevant methodologies for examining decision strategy are examined. Students develop an ability to explain foreign policy decisions of the United States. The class is a seminar with regular readings, discussions, and class reports of ancillary readings. One research paper for the year is presented orally in class, and a short essay near the end of each term.

3574B/5574B Chinese Foreign Relations: seminar 2 hours, R.L. Dial.* China's international behaviour and the policy process shaping that behaviour will be explored through the proposition: "A nation's foreign policy is a device for maximizing external sovereignty and controlling internal interests with external consequences." Prior classes on Chinese politics are not required for this class.

3575B/5575B Nuclear Weapons and Arms Control in World Politics: seminar 2 hours, staff. An introduction to issues of arms control and disarmament, focussing on nuclear weapons and strategic arms limitations in particular. Technical, historical, doctrinal, and political aspects all will be examined.

3590/5590 The Politics of the Sea: seminar 3 hours, E.M. Borgese. The major issues involved in the Law of the Sea, the differing interests of different countries, the developing legal framework, and the political process of the on-going negotiations are covered. There is a great deal of ground to be covered so preference is given to graduates although mature students from other relevant disciplines are welcome.

3596A/5596A Theories of War and Peace: seminar 2 hours, D.W. Middlemiss.* Prerequisites: A course in international relations, or the instructor's permission. This seminar examines critically a broad range of theories regarding the causes, persistence, and termination of organized, collective, international violence. Explanatory factors and evidence will be drawn from the disciplines of anthropology, biology, economics, psychology, sociology and international relations.

4520/5520 Theories of International Relations: lecture and discussion 2 hours, G. Winham. A brief survey of the discipline of international relations is presented. Three problems of international relations: conflict and war; the nature of economic disparities and imperialism; and the organization and interaction of nation-states are focussed upon. The class is a study in politics, but course readings are multidisciplinary. Students read the works of historians, economists, social psychologists and the work of political scientists. Students participate regularly in seminars and write a series of essays during the year.

3601/5601 Readings in Political Science: staff. A full-year reading class, taught only by special arrangement between individual students and individual instructors.

3602A/5602A Readings in Political Science: staff. A first-term reading class, taught only by special arrangement between individual students and individual instructors.

3603B/5603B Readings in Political Science: staff. A second-term reading class, taught only by special arrangement between individual students and individual instructors.

4600 Honours Essay

Psychology

Chairperson of Department
R.S. Rodger

Professors

M. Cynader, BSc (McG), PhD (MIT) *Killam Research Professor*
P.J. Dunham, MA, PhD (Missouri)
J.C. Fentress, BA (Amherst), PhD (Cantab.)
D.O. Hebb, BA (Dal), MA (McG), PhD (Harvard), DSc, DHL, LLD *Honorary Professor*
W.K. Honig, BA (Swarthmore), PhD (Duke)
V.M. LoLordo, AB (Brown), PhD (Penn.) *Graduate Studies Coordinator*
J.A. McNulty, MA, PhD (Tor.)
D.E. Mitchell, BSc, M.App.Sc. (Melb.), PhD (Berkeley)
S. Nakajima, BA (Chiba), MA (Wash.), PhD (McG.)
D.M. Regan, BSc, MSc, PhD, DIC, DSc (Lond.) (Honorary Professor and Director of Centre for Research in Sensory Psychology and Medical Physics)
K.E. Renner, BS (Penn.), MA, PhD (Northwest.)
R.S. Rodger, MA (Edin.), PhD (Belf.)
M.G. Yoon, BS (Seoul), PhD (Berkeley)

Associate Professors

J. Barresi, BSc (Brown), MA (S. Calif.), PhD (Wisconsin)
K. Bloom, BSc (Loyola), MA, PhD (N.Car.)
R.E. Brown, BSc (Victoria), MA, PhD (Dal)
J.W. Clark, MA (McG), PhD (Qu.)
B. Earhard, BA, MA, PhD (Tor.)
R. Klein, BA (SUNY), MA, PhD (Oregon)
I.A. Meinertzhagen, BSc (Aberdeen), PhD (St. Andrews)
B.R. Moore, AB (Emory), PhD (Stan.)
M. Ozier, MA, PhD (Tor.)
R.L. Rudolph, MA (DePauw), PhD (N.Car.)
B. Rusak, BA (Tor.), PhD (Berkeley)
S.R. Shaw, BSc (Lond.), PhD (St. Andrews)

Assistant Professors

S. Bryson, BA (Guelph), PhD (McG)
J. Connolly, AB (Holy Cross), MA (Saskatchewan), PhD (London)
J. Enns, BA (Winnipeg), MA, PhD (Princeton)
J. Werker, BA (Radcliffe), MA, PhD (UBC), (on leave)

NSERC University Research Fellows

R. Croll, BSc (Tufts), PhD (McGill)
M. Spetch, BA, MA, PhD (UBC)
D. Treit, BA, MA, PhD (UBC)

Senior Instructors

R.S. Hoffman, BSc (Col. Coll.), MA (Dal)
L.E. White, BSc (Calgary), MS (Sask.), PhD (Cantab)

Postdoctoral Fellows

C. Baker BS (Virginia Poly Technic), PhD (Cal. San Diego)
K. Berridge BA (California/Davis), PhD (Pennsylvania)
C. Edwards MA (Kentucky), BA (Berea), PhD (Kentucky)
K. Grasse BA, MA, PhD (Dal)
D. Phillips BSc, PhD (Monash)
R. Ross BA, MA (CA, Fullerton), PhD (Pittsburgh)
N. Swindale PhD (Cambridge)

Research Associates

A. Fröhlich Dilporm, PhD (Freie Universität Berlin)

Psychology is an experimental science; its purpose is to discover the conditions which control the activities of animals and people, to measure these conditions and the responses they produce, and to use this knowledge to invent ways of predicting behaviour and changing it. It is a subject for inventive but also scientifically rigorous people; better suited to those who want to find out for themselves than to those who want to be told what to believe.

Psychology at Dalhousie treats behaviour as a natural phenomenon, and in that sense shares much with the other life sciences. Today, for example, the boundary that historically has separated psychology from zoology, physiology, or even cellular biology has begun to blur. On the other hand, important ties are being made to such disciplines as anthropology and sociology. The student will find that the diverse subject matter includes three major levels of analysis: the organism, the organism's biological machinery, and the broader social-environmental context in which particular behaviour patterns are expressed. Meaningful integration of these diverse levels and forms of analysis is an intellectual challenge of major proportions. Similarly, the time perspectives of immediate causation, development, evolution, and function all contribute to the modern approach to behavioural science; each must be evaluated in relation to the others.

Degree Programs

BA or BSc

Students enrolled in the bachelor's (i.e., three-year) program must take at least four and no more than eight full credits beyond the introductory level in their area of concentration. Required classes for students who intend to major in Psychology are listed below. Although there is considerable freedom of choice, it is important for the prospective major to plan ahead carefully. If you need advice planning your program, see Dr. B. Rusak, Dr. J. McNulty, or Dr. R. Rudolph.

Requirements for a bachelor's degree

1. Psychology 1000 or Psychology 1010
2. Psychology 2000A
3. At least three more 2000-level classes (either full or half credits)
4. At least two more full credits in Psychology from 3000-level classes, one of which is a laboratory class.

BA or BSc with Honours in Psychology (Major Program)

Students enrolled in the major honours program must take at least nine and no more than eleven full credits beyond the introductory level in their area of concentration. Requirements for the Honours Degree in Psychology are listed below.

It is recommended that students in this program take 2000A and 2500B and as many classes from the core program (see requirement 3 below) as possible in the second year. Honours students are advised to complete Psychology 3500 prior to the fourth year. 4000-level seminars may be taken in the third and fourth years. 2000 or 3000 level classes may be taken at any time provided that the student meets the necessary prerequisites.

Although there is considerable flexibility for the student, it is important to plan carefully (this is especially true for those considering graduate work in Psychology). If you need advice in planning your program, see Dr. B. Russak, Dr. J. McNulty, or Dr. R. Rudolph.

Requirements for an Honours Degree in Psychology

1. Psychology 10000 or Psychology 10100
2. Psychology 2000A and Psychology 2300B
3. At least four more 2000-level classes (either full or half credits).
4. Psychology 33500.
5. At least two full credit classes at the 3000-level, one of which is a laboratory class.
6. Psychology 45000 (Honours Thesis)
7. At least one full credit of 4000-level seminars
8. At least one more full credit of Psychology at or beyond the 3000-level.

Combined Honours

It is possible for students to take an honours degree combining psychology with a related arts or science subject. In such a combined honours program the student must take eleven full credits beyond the 10000-level in two areas of specialization, with not more than seven full credits in either area. The student in the combined honours program normally writes a thesis (or the equivalent) in the elective major area in which the majority of classes are taken. Any student intending to take a combined honours degree should consult with the two respective departments to arrange program details.

Other Programs

A variety of other programs are available in cooperation with other departments. These programs are designed to meet the needs of students whose specific interests may lie in areas other than those covered by the major and honours programs offered by the department. Interested students should contact Dr. R. Rudolph, Dr. J. McNulty, or Dr. B. Russak for further information.

Financial Aids

Teaching Assistantships, Research Assistantships, and NSERC Summer Student Fellowships are available, during both the academic term and the summer vacation, to students who are taking an honours degree in psychology. Details of these assistantships and of the stipends may be obtained from Dr. L.E. White, Dr. J. McNulty, or Dr. R. Rudolph.

10000 Introduction to Psychology: lecture 3 hours, staff. Students interested in the biological and social bases of behaviour in both men and animals may complete the class with an understanding of how the senses work and of how, for instance, we learn to see, of the different kinds of memory in man, how they operate, and how they are affected by disorders of the brain, of the way in which hereditary and environmental factors interlock to produce these complex sequences of behaviour which distinguish one species from another, of the way in which children learn their native language, of how the form of an animal society can be predicted from a knowledge of a limited number of ecological facts. Psychology 10000 meets three hours a week for lectures. The grade is based on a number of examinations given at intervals throughout the year.

10100 Introduction to Psychology: tutorials 3 hours, staff. The content of Psychology 10100 is similar to that of Psychology 10000 but the manner of teaching differs. In Psychology 10100 there is neither a fixed pace for covering the content of the class, nor regularly scheduled lectures. Instead, students work through the readings at their own pace, and, when they think

that they have mastered a unit of the readings, attend an individual tutorial. The tutorial consists of a brief test on the readings followed by a review of the test and a discussion with the tutor. If the tutor judges the student's understanding of the unit to be inadequate, the student returns for another tutorial on the unit after additional preparation. Tests on a unit of work may be re-written until understanding is achieved and demonstrated. The grade for the class is based on the number of units passed by the end of the year.

2000A Methods in Experimental Psychology: lecture 2 hours, lab 2 hours, P. Dunham and other members of the department. Prerequisite: Psychology 10000 or 10100. An introduction to the methodological tools which have been developed by research psychologists to study behaviour. In lectures, we proceed from a discussion of the general problem of applying the scientific method to the study of behaviour to more specific procedures used by psychologists in studying various aspects of animal and human behaviour. The laboratory work consists of a series of projects illustrating some of the more important techniques discussed.

2020A or B Psychological Aspects of Social Issues: lecture 3 hours, K.E. Renner. Prerequisite: Psychology 10000 or 10100. Most of the important social issues of our time have implications for human adjustment, for the forms of our social institutions, and for the relationships between people and between people and their institutions. Topics vary according to current issues. Selected topics are examined in greater detail to provide a context for formulating general psychological concepts and theoretical issues. The logical implications of the analysis for prescriptions for the future are pursued.

2030 Psychological Measurement: lecture 3 hours, R.S. Rodgers. Prerequisite: Psychology 10000 or 10100. After some of the abstract properties of measurement systems are described, aspects of psychological measurement are discussed. Further elaboration of measurement procedures in psychology requires a knowledge of statistical theory. The required amount of this theory is given and used in the context of signal detection theory and the analysis of data from paired comparison experiments. The class ends with consideration of mental test technology. Exercises are scheduled regularly for students to do out of class. A knowledge of higher mathematics is not required; high school arithmetic and algebra are generally sufficient.

2070 Introduction to Neurosciences: lecture 3 hours, I.A. Weimertzhagen. Prerequisite: Psychology 10000 or 10100 or consent of instructor. For those not having Psychology 10000 or 10100, Biology 10000 and 2020 would be advantageous. Neuroscience is the newly evolving interdisciplinary field which aims to integrate findings in many diverse areas of brain research into a single systematic framework. This class introduces a number of aspects of this field emphasizing analyses which are precise at the neuronal level. A general introduction is provided by the vertebrate visual system, followed by analysis of the structure and function of neurons, including the ionic basis of their electrical activity and the neurochemistry of synaptic transmission between neurons, aspects of drug action, the control of activity in the motor nervous system and examples of the integration and development of nerve cells.

***2080A or B Social Psychology:** lecture 3 hours, J.W. Clark. Prerequisite: Psychology 10000 or 10100. Some major issues in social psychology are introduced through a critical analysis of theories and research in which the behaviour of the individual is seen as a product of the social context. The student reads papers on such topics as helping, obeying, suppressing, liking and hating. Questions on these papers are to be answered out of class and submitted at intervals throughout the term. The lectures are intended to promote a close and sceptical evaluation of the readings.

2090A or B Developmental Psychology: lecture 3 hours, J. Erms. Prerequisite: Psychology 10000 or 10100. The origins of human behavioural development from a biological and psychological perspective.

2120 A or B Clinical Psychology: lecture 3 hours, J. Connolly. Prerequisite: Psychology 1000 or 1010. Restriction: This class may not be taken concurrently with Psychology 3120. Different approaches taken in the field of clinical psychology, both theoretical and applied, are introduced. As the primary focus of clinical psychology is abnormal human behaviour, considerable time is devoted to the problem of defining the concepts of "mental illness," "psychopathology," and "abnormal" behaviour. A broad overview of intervention programs ("therapies") is provided.

2130 A or B Introduction to Cognitive Psychology: lecture 3 hours, B. Earhard. Prerequisite: Psychology 1000 or 1010. Lectures focus on the processes involved in transforming sensory information into the meaningful, coherent world of everyday experience we know. Initially, emphasis is on the visual system, and how information within that system is structured and organized, followed by a consideration of the character of the internal representations used in thinking and remembering.

2140 A or B Learning: lecture 3 hours, V. LoLordo. Prerequisite: Psychology 1000 or 1010. Traces the experimental study of learning from the turn-of-the-century research of Pavlov and Thorndike to the present. Development of the field of animal learning is described in terms of the ways in which particular conceptions of the learning process have guided experimentation, and have in turn been revised on the basis of the outcomes of that experimentation. Some important concepts discussed are: association, attention, biological constraints of learning, classical conditioning, discrimination, expectancies, law of effect, learning-performance distinction, operant conditioning, S-S and S-R bonds, and stimulus control. The value of various approaches is discussed with respect to several goals: (1) providing general principles of learning; (2) understanding the behaviour of particular species; (3) direct application to human problems. Emphasis is on understanding why researchers in animal learning do what they are currently doing (given the goals and the historical context), rather than on learning a number of facts about animal learning.

2150 A or B Perceptual Processes: lecture 3 hours, J. McNulty. Prerequisite: Psychology 1000 or 1010 or Biology 1000. Perception deals with the way in which our senses provide us with information about our environment. This class focusses on the process by which sensory experiences are coded, how they are interpreted by the nervous system, and how experience modifies perception.

2160 A or B Animal Behaviour: lecture 3 hours, B.R. Moore. Prerequisite: Psychology 1000 or 1010 or Biology 1000. An examination of the natural and, to a lesser extent, the laboratory behaviour of several intensively-studied groups of animals. Foraging and communication, predation and defense, sex and aggression, homing and migration are studied as they occur in such organisms as bees and ants, moths, bats, chimpanzees and various birds.

2170 A or B Hormones and Behaviour: lecture 3 hours, R.E. Brown. Prerequisite: Psychology 1000 or 1010 or Biology 1000. An introduction to the endocrinological bases of mammalian social behaviour. Emphasis is on the mechanisms by which the hormones of the hypothalamus, pituitary gland, gonads and adrenal gland control sexual, aggressive and maternal behaviour. Other topics covered are: hormone receptors in the brain; the menstrual cycle and human reproduction; puberty; sex differences in the brain; the pineal gland; neuro-transmitters; pheromones; crowding and social stress.

2270 A or B Human Neuropsychology: lecture 3 hours, S.R. Shaw. Prerequisite: Psychology 1000 or 1010. This class explores the organization of the human brain and its support systems, attempting to explain the complexity of both normal and abnormal function, as revealed by the consequences of accidents, defects, and surgical intervention, as well as

animal models. Emphasis throughout is placed on trying to understand the mechanisms underlying phenomena. Aphasia, epilepsy, the involvement of certain brain chemicals in behaviour, cerebral asymmetry, the potential for neural prostheses, the dispute over localization of function in the brain are examples of topics covered.

2500B Contemporary Research Problems in Psychology: lecture 2 hours, lab 3 hours, P. Dunham and staff. Prerequisite: 2000A. Primarily for honours students as a continuation of Psychology 2000A, this class consists of working through a research problem with the instructor on a one to one basis. By the end of the class, the student completes an independent experiment and submits a written report of the data. Students other than honours students may take the class with the permission of the instructor.

3000 Independent Research in Modern Psychology: lab 4 hours, staff. Prerequisites: Psychology 2000A and previous or concurrent enrollment in two other 3000-level classes; and the prior consent of the instructor. Primarily for students wishing further experience and understanding of psychological research. A student in the class chooses a member of staff who serves as his class adviser throughout the academic year, and under whose supervision independent research is conducted.

3010 Advanced General Psychology: lecture 2 hours, tutorials 3 hours, R. Rudolph. Prerequisites: The consent of the instructor, Psychology 2000A, and at least concurrent registration in two other 3000-level psychology classes. For the advanced student, a review of general psychology with the aim of consolidating the student's knowledge of the foundation. The method is unconventional. With the assistance of the instructors, the student prepares the material assigned to Psychology 1010 at a level which enables him or her to instruct introductory students in individual tutorials. The grade is based on two examinations. Students should consult with Dr. R. Rudolph in the spring in order to begin preparation before classes start in the fall.

3020 Community Psychology: lecture 1 hour, lab 2 hours, K.E. Renner. Prerequisites: Psychology 2000A, and 2020. A cooperative relationship is established with local community and social action groups in which current issues or problems become the focal point for a field laboratory course. Topics vary from year to year. Classroom work centres on concepts of community psychology and on teaching field research skills and techniques.

3040 Learning and Motivation: lecture 2 hours, lab 2 hours, B.R. Moore. Prerequisite: Psychology 2000A and 2140. An examination in detail of a few selected topics within the field of learning and conditioning. The emphasis is on identification and clarification of fundamental processes, their boundaries, biological significance and evolutionary history. Conventional wisdom is accepted only as a last resort. We work from original papers and monographs rather than secondary sources. After suitable preparation, students move toward guided original research on questions arising from readings and discussion. The first half of the course, approximately, is a seminar; the remainder is research.

3050 Perception: lecture 2 hours, lab 3 hours, D.E. Mitchell. Prerequisite: Psychology 2000A and 2150. This class considers the way in which information about the world is provided by the senses and how we use this information in our behaviour. The material falls into four sections. (1) The methodological and theoretical problems peculiar to the study of sensation and perception; (2) The transformation of physical stimulus energy into neural energy; (3) The physiological and psychophysical analysis of the sensory systems with particular emphasis on vision; and 4. The development of perception and its relation to the anatomical and physiological development of the sensory pathways. The experimental work has been selected for its importance in the theoretical understanding of perceptual processes and consists of a general introduction to the apparatus and methods used in perceptual research.

3070 Physiological Psychology: lecture 2 hours, lab 3 hours, S. Nakajima. Prerequisite: Psychology 2000A or permission of the instructor. Physiological psychology is concerned with the biological explanation of psychological phenomena such as perception, motivation, learning and memory. Students should have a working knowledge of concepts and methods in experimental psychology. Emphasis is on psychological issues with the answers sought in physiological terms. As an alternative to the laboratory section, students may elect to write an extensive review paper on a topic to be agreed upon by the instructor, but those electing to do so may *not* use this course to meet the laboratory requirement.

3080 Experimental Social Psychology: lecture 3 hours, lab 1 hour, J. Barresi. Prerequisite: Psychology 2000A. This class involves the study of individual behaviour as a function of social stimuli with emphasis on extensive student research projects and class presentations. The class develops from discussion of research designs and methods to the study of basic processes such as person perception, social comparison, and social influence, including behaviour within groups and the relations between groups.

3090 Early Development: lecture 3 hours, fieldwork 1 hour, J. Enns. Prerequisite: Psychology 2000A. This class considers changes in the way humans acquire, structure, and communicate knowledge from birth to young adulthood. General theories of cognitive development are covered in addition to studying changes in specific skills in perception, memory, and language. The emphasis throughout will be on how questions concerning human abilities can be posed and answered.

3120 Issues in Clinical Psychology: lecture 2 hours, seminars 2 hours, S. Bryson. Prerequisite: Psychology 2120 or permission of instructor. As with most areas of any science, sacred cows roam at large in the field of clinical psychology. The purpose of this class is to sit on the horns of the dilemmas and slaughter the beasts. A second goal is to learn how to present, listen, and participate in seminars. The issues include such topics as altered states of consciousness, concepts of intelligence, approaches to psychological testing, theories of schizophrenia, theories of therapies, women and madness, and death.

3130 Cognitive Psychology: lecture 2 hours, lab 2 hours, R. Klein. Prerequisites: Psychology 2000A, and either 2130, 2150, 2270 or consent of instructor. Cognitive psychology deals with how we gain information about the world, how such information is represented and transformed as knowledge, how it is stored and how that knowledge is used to direct our attention and behaviour. It involves the processes of perception, memory, attention and thinking. This class focusses not only on what is known about human cognition, but also on techniques cognitive scientists have developed to discover this knowledge.

3160 Ethology: lecture 2 hours, lab 2 hours, J. Fentress. Prerequisites: Psychology 2000A or Biology 1000. Ethology is the biological study of behaviour. It uses psychology, genetics, physiology, ecology and evolutionary theory to solve problems in the development, function and causation of behaviour across all animal species. These diverse approaches to the study of animal behaviour are presented in naturalistic and experimental situations. In laboratory exercises qualitative and quantitative records of behaviour are made in the field and in the laboratory. There are several group research projects (first term) and an individual research project (second term).

***3190 Psychology of Language:** lecture 3 hours, staff. Prerequisite: Psychology 2000A. Psychology 2130, 2140, 2150 or 2270 are suggested. Enrolment is limited to 3rd and 4th year students or by special permission of the instructor. The ability to translate complex ideas into a string of words which can then be understood by a listener is quite an accomplishment.

Yet, nearly every human acquires this ability within the first few years of life. The psychology of language explores questions on this topic through a combination of lectures, demonstrations, and student research projects.

3260 A or B Biological Rhythms: lecture 3 hours, B. Rusak. Prerequisite: Psychology 1000 or 1010 or Biology 1000. Virtually all physiological and behavioural parameters in animals and humans are rhythmic. Rhythms of critical interest are those that correspond to major geophysical cycles: daily, lunar, and annual rhythms. Research in this area ranges from studies of cell biochemistry to studies of star-map orientation; a broad introduction to this highly interdisciplinary subject is presented.

3270 A or B Developmental Neuroscience: lecture 3 hours, M. Yoon. Prerequisite: Psychology 2070 or consent of instructor. For those interested in the development of the structures and functions of the nervous system. The class introduces three main aspects: (1) Embryonic development of the nervous system; primary morphogenetic movements of cells, birth of neurones and neuroglial cells, and migration of neurones to specific places in the nervous systems. (2) Formation of functional interconnections among neural elements; synaptogenesis, topographic patterns of neural connections, synaptic organizations of various parts of the nervous systems. (3) Specificity and plasticity in regeneration or reorganization of the neural connections following various experimental manipulations of the nervous system.

***3360 A or B Human Sociobiology:** lecture 3 hours, staff. Prerequisite: Psychology 1000 or 1010 and 2000A. Some differences in behaviour may be heritable, just as some physical differences are. Insofar as this is true, these behavioural differences are subject to both natural and sexual selection. Sociobiology aims to understand how the behaviour of animals and men has evolved in response to these selective pressures. An introduction to the central questions of sociobiology.

3370 A or B Neuroscience Laboratory: lab 3 hours, S.R. Shaw. Prerequisite: Psychology 2000A and 2070 or 3270A. An introduction to several techniques used in contemporary neuroscience. Regularly scheduled labs with students working in pairs under supervision are supplemented by occasional lectures. The program aims at familiarizing students with electrical stimulating and recording methods and related techniques, and currently uses both sensory and motor nerve preparations. Structural analysis of the nervous system is introduced by way of Golgi neuroanatomy, and electro-microscopy of visual system or CNS.

3460 A or B Behavioural Ecology: lecture 2 hours, seminar 1 hour, J. Fentress, M. Rose. Prerequisite: Psychology 1000 or 1010 or Biology 1000. This class is cross-listed as Biology 3062 (A or B).

3500 Statistical Methods in Psychology: lecture 2 hours, practicum 2 hours, K. Bloom. Prerequisite: Psychology 2000A and 2500B. This class is primarily intended for honours students, but other students are admitted with the consent of the instructor. This class is designed to enable students to understand parametric and nonparametric statistical procedures and their descriptive and inferential application to behavioural research. In addition, students learn to execute computer programs for data organization and analysis. Course work includes lecture, seminar, and statistical/computer assignments.

Psychology 3760 A or B Neuroethology: lecture 3 hours, R. Croll. Prerequisites: Psychology 2000A or 2160 or 2070 or Biology 2020 or consent of the instructor. Neuroethology is the study of the neural bases of animal behaviour. The course will emphasize cellular approaches toward understanding the integrative mechanisms of the nervous system which underlie complex behaviours. Feature detectors, command systems and motor program generators will be examined in depth using examples from vertebrate preparations. Cellular bases of higher order functions such as motivation, learning and choice will be explored if time permits.

4000 Level Seminars

These seminars (4000-4500) are intended for 3rd and 4th year honours students. Others may enroll in these classes only with special permission of the instructor. The topics covered in these classes vary from year to year. Consult the department for the specific course descriptions.

4000A or B Senior Seminar: 2 hours, staff.

***4040A or B Applications of Conditioning and Learning:** 2 hours, W.W. Lobl. Topics may include: (1) Clinical and social applications of learning principles; (2) Pain, fear, and stress.

***4050A or B Topics in Perception:** 2 hours, W. Cymatter. This class is primarily a discussion of cortical organization in perception.

***4070A or B Neuroscience Seminar:** 2 hours, W.G. Yoon. Prerequisites: Psychology 2070 and 3270, or consent of the instructor.

***4080A or B Topics in Social Psychology and Personality:** 2 hours, J. Barresi.

***4090A or B Development of Social Behaviour:** 2 hours, K. Bloom.

***4120A or B Topics in Clinical Psychology:** 2 hours, K. Connolly.

***4130A or B Topics in Human Information Processing:** 2 hours, W. Ozier.

***4140A or B Animal Learning Topics:** 2 hours, M. Spetch. This is a seminar in which selected topics in animal learning are reviewed in some detail. The emphasis is on cognitive aspects of learning. The class is a directed study, and may involve participation in research.

***4160A or B Topics in Behavioural Biology:** 2 hours, B. Rusak.

***4230A or B Human Performance Topics:** 2 hours, J. McNulty.

***4440A or B Topics in Cognitive Development:** 2 hours, staff.

4500 Honours Thesis: members of the department. Prerequisites: Restricted to honours students in their graduating year. The purpose is to acquaint the student with current experimental problems and research procedures in experimental psychology. Each student works with a staff member who advises the student about research in the major area of interest, and closely supervises an original research project carried out by the student. Each student must submit a formal report of the completed research in APA style. The final grade is based upon the originality and skill displayed in designing the project and upon the submitted report.

4580 History of Psychology: seminar 2 hours, J.W. Clark. Prerequisites: Restricted to honours students. Prerequisite reading: It would be advantageous to read E.G. Boring's *History of Experimental Psychology* before the class starts. This class discusses the evolution of thought about some psychological issues that have been of central concern throughout man's intellectual history. The understanding of such issues is traced in the writings of the major contributors from antiquity to the emergence of experimental psychology in the nineteenth century, and their development is examined in the work of psychologists in the early years of this century.

Religion

Professor

R. Ravindra, BSc, MTeach, (IT), W.A. (Dal), WSc, PhD (Tor) (Chairperson), Adjunct Professor of Physics

Associate Professor

C.T. Sinclair-Faulkner, BA (Tor), MTh, W.A, PhD (Chic)

The University study of religion aims at an intellectual understanding of this more than intellectual reality. Religion is a phenomenon virtually universal in human society and history; some have felt that it is central to the human condition. Understanding involves grasping simultaneously both the meaning of faith in the lives of participants, and the critical analysis of outside observers. Both the student wishing enhanced understanding of religion as a historical and social and human fact, and the student who wishes to wrestle with problems arising in academic reflection concerning the relation between the personal and the objective, can find material to engage them in the courses described below.

BA

Students wishing to major in Religion must successfully complete Religion 1010 or 1301, and at least four classes in Religion beyond the 1000 level. This provides them with a broad introduction to both Eastern and Western religious life, and to the various ways in which religion may be studied. In the light of their specific interests, Religion majors are encouraged to enroll in related classes offered by other Departments. Programs should be planned in consultation with the undergraduate adviser, Dr. C.T. Sinclair-Faulkner.

Please consult the current timetable on registration to determine which class is offered.

Classes Offered

1010/2010 Love in World Religions: lecture and seminar 3 hours, R. Ravindra (no prerequisite). What is love? Why is something so universal and important also so problematic? Is it possible to love in the midst of intense suffering and hatred? Various aspects of love and related feelings, such as eros, agape, compassion and mercy, are studied in this class from the perspective of major religions. Material is drawn from many sources such as the *Song of Songs*, *Love Song of the Dark Lord*, mystical poems of St. John of the Cross, Kabir, and others. Traditional rites associated with a Hindu and a Christian wedding will also be examined.

1301 Introduction to the Study of Religion: lecture 2 hours, section meeting 1 hour, C.T. Sinclair-Faulkner. (No prerequisite). Religion is: a way of life? an encounter with God? a neurosis? the essential human trait? an epiphenomenon? The possibilities are explored by using the insights of modern social scientists, humanists, and theologians to study Canadian life. This class fulfills the first-year Writing Requirement. A detailed syllabus is available from the Department of Religion.

2020 Death and Afterlife in World Religions: lecture and seminar 3 hours, R. Ravindra. What is death? What meaning can life have in the face of the inevitability of death? Does individual identity come to a complete end or does one continue existence in some form, as most religions assert? What is the nature of judgement after life? Is there re-incarnation? These questions will be discussed on the basis of material drawn from major religions in a comparative perspective.

2101 Western Spirituality: lecture and seminar 2 hours, C.T. Sinclair-Faulkner. The Western world has known many different ways to be religious: personal, mystical, political, rational, sensual. Original accounts of Jewish,

Christian, Muslim and pagan spiritualities are studied in their historical context. Each student undertakes a guided study of some twentieth-century religious experience of his or her choice. A detailed syllabus is available from the Department of Religion.

2202 Religion and Culture in India: lecture and seminar 3 hours, R. Ravindra. An introduction to the rich variety of spiritual and religious expressions in the vast culture of India. Some of the major ideas, practices and gods are discussed; their continuity as well as radical departure from them in the development of Buddhism, and in their encounter with Islam and later with Christianity in India will be examined. The second term is devoted to an intensive study of the *Bhagavad Gita* and its relevance to modern life.

2303 Religion in Story: lecture and seminar 3 hours, C.T. Sinclair-Faulkner. When religious people seek answers to ultimate questions or try to come to grips with the mystifying phenomenon of the Holy, they turn to stories. Modern novels and short stories, particularly Canadian works, are the primary reading assignments in this class. They are set in the context of related material from the broader western culture, including the Jewish scriptures and *The Pilgrim's Progress*. A detailed syllabus is available from the Department of Religion.

2040 Comparative Study of Christianity and Other Religions: lecture and tutorial 3 hours, R. Ravindra. The task of the comparativist is difficult and challenging, demanding integrity, empathy and self-critical awareness. It is also a radical task, calling into question the very roots of other traditions as well as of one's own. The first half of the class asks fundamental general questions: What materials in different traditions are comparable? What psychological and intellectual attitudes are required for such a study? The second half is devoted to a comparative study of the *Bhagavad Gita* and the four gospels, particularly around the themes of love, knowledge and action.

2030 Religious Myths, Symbols, and Rites: lecture and seminar 3 hours, R. Ravindra. Myths, symbols and rites have been among the major vehicles of spiritual truths and psychological insights in all religions. After a general discussion of the nature of symbolic understanding, the focus is on the major myths and symbols associated with the lives and activities of Krishna, Shiva, Gautama Buddha and Jesus Christ, including the cross, the portrait of the Buddha and the dance of Shiva.

2121 Religion in Canada: lecture and seminar 3 hours, C.T. Sinclair-Faulkner. When Canadians have built cities, gone to war, founded economic empires, fallen in love, designed school systems, and elected governments, religion has often been a decisive factor. Sometimes religion has been *the* decisive factor. What is "Religion in Canada? In the course of this extensive historical study of life in Canada from the sixteenth century to the present, a variety of answers will be explored. A detailed syllabus is available from the Department of Religion.

3531 Mystical Consciousness and Modern Science: seminar 2 hours, R. Ravindra. Prerequisite: A class in Religion or in Science (preferably both). Yoga, Zen, Prayer of the Heart, Sufism and other spiritual disciplines have gathered an enormous amount of experiential and theoretical material about human consciousness and its many levels, from the ordinary to the mystical and cosmic. The first term is devoted to developing a typology of human consciousness based on these disciplines. The second term is devoted to a critical examination of this typology in the light of modern scientific discoveries, and of the fundamental presuppositions of modern science in the light of the universal experience and knowledge of the many levels of consciousness.

3500 Rise of Science and the Modern World: lecture and seminar 3 hours, R. Ravindra and J. Farley, (same as Physics 3400, History 3700 or Biology 3400.) After studying the rise and nature of modern science, the

second term is devoted to some issues between science and religion in the modern world. For more details see description under Biology 3400.

3310A/5310A-3320B/5320B Topics in Religion: seminar 2 hours, staff. Structured as a seminar or for independent guided study depending on the interests and needs of the students and the faculty. The intention is to devote some concentrated time to a specific topic of interest, such as *Cults and New Religions*, *The Feminine in World Religions*, *Religious Aspects of Middle-East Politics*, *Tradition and Modernity*, etc. Please consult the Department for the topic which may be discussed in any given term.

Russian

Professor

Y.Y. Glazov, PhD (Oriental Inst.), F. (Moscow)

Assistant Professors

J.A. Barnstead, BA (Oakland), AM (Harv.)

I. Vitins, BA (Mich.), PhD (Calif.), (Chairman)

The Russian Department offers classes in Russian language, literature, and culture. Since the Soviet Union plays a crucial role in today's world and makes important contributions in a wide variety of scientific, technical, and humanistic fields, knowledge of its linguistic and cultural backgrounds can prove advantageous in many areas of study. Students in the sciences and mathematics find Russian especially useful, as it can give them a lead of six months to a year over those who must wait for journals to be translated.

In the language classes emphasis is placed on gaining a thorough grasp of Russian grammar and an extensive speaking, reading, and writing vocabulary.

One of the richest areas of Russian life is its literature. Dostoevsky, Tolstoy, Chekhov, Pasternak, Solzhenitsyn and many other Russian writers have made significant contributions to world culture. Classes in Russian literature are generally offered in English and in Russian in order to give as many students as possible the opportunity to become acquainted with its masterpieces.

Classes in Russian culture and civilization are intended to introduce students to art, architecture, music, religion, and other areas of Russian life which are necessary to understand the language and literature. Films, guest speakers, and evenings of Russian poetry are scheduled periodically.

Major or honours students may, with the approval of the Department of Russian, take up to one year (5 full credits) of work at a University in a Russian-speaking country and receive credit at Dalhousie.

Degree Programs

Classes in the Russian Department are open to students either (1) as electives in any degree program; or (2) as constituents of a major or honours degree in Russian; or (3) with classes in another foreign language forming parts of a combined honours degree.

Classes Offered

100 Elementary Russian: lecture 4 hours, no prerequisites. For students who have little or no previous knowledge of the Russian language. Equal emphasis is placed on developing oral and reading skills with a sound grammatical basis.

- 105 Reading Russian:** lecture 3 hours, no prerequisites. This class provides a knowledge of Russian grammar sufficient to read technical materials with the aid of a dictionary and covers rudiments of pronunciation. In the second semester the student is introduced to the specialized vocabulary of his particular field. This class does not qualify students to take Russian 200.
- 200 Intermediate Russian:** lecture 4 hours. Prerequisite: Russian 100 or equivalent. A continuation of Russian 100. Oral and reading skills and a further knowledge of grammar are developed through the study of Russian texts.
- 202A Russian Literature and Culture:** lecture and discussion 2 hours, no prerequisites. Conducted in English. The class traces developments in classical Russian literature, as well as in the Russian arts: painting, sculpture, theatre, and music. Religious and secular ideas of 19th century Russia are also discussed.
- 205 Survey of Russian Literature:** lecture 2 hours, no prerequisites. Conducted in English. The first half of this class concentrates on the outstanding writers of the nineteenth century, including Pushkin, Gogol, Dostoevsky, Turgenev, and Tolstoy. The second half of the class is devoted to the study of such authors as Chekhov, Gorky, and leading post-revolutionary writers and poets: Mayakovsky, Sholokhov, Pasternak, and Solzhenitsyn.
- 207A Russian Literature and Culture after Stalin's Death:** lecture and discussion 2 hours, no prerequisites. Conducted in English. The literary, cultural, and political history of Russia after Stalin's death in 1953. Among the major issues considered are the significance of Stalin's death, the "Thaw" and de-Stalinization, Pasternak, Solzhenitsyn, Nadezhda Mandelstam and Sakharov. Revival of the intelligentsia and religious trends. Relationships of Russia and the West. Official and non-official culture.
- 224A/B Theories of Literature:** lecture and discussion 2 hours, no prerequisites. Conducted in English. This class surveys Russian thought about literature from mediaeval times to the end of the nineteenth century, then concentrates on a more detailed study of twentieth century theories. Emphasis is on the complex interrelationships of modern Russian theories of literature with their Western counterparts, e.g. Formalism and American "New Criticism." Topics treated include formalism, early Marxist criticism, Socialist Realism, post-Stalin Marxist criticism, Structuralism, and Tartu School of semiotics. Student discussions and papers apply the principles of a given school to practical criticism of works of their choice, demonstrating the strengths and weaknesses of each theory.
- 234A/B Russian Modernism:** lecture and discussion 2 hours, no prerequisites. Conducted in English. A study of trends in literature and the arts at the turn of the century. Known as "The Silver Age," this is one of the most innovative and dynamic periods in Russian culture.
- 250A/B Tolstoy:** lecture and discussion 2 hours, no prerequisites. Conducted in English. An introduction to the work of this enigmatic spiritual giant of Russian literature; the impact of his philosophy and writing on world literature and thought. Reading includes the epic *War and Peace*, *Anna Karenina*, and the controversial *Kreutzer Sonata*.
- 252A/B Chekhov and Turgenev:** lecture and discussion 2 hours, no prerequisites. Conducted in English. Close analysis and discussion of the major works of Turgenev, sensitive portrayer of socio-political and psychological issues of the second half of the nineteenth century in Russian, and Chekhov, unequalled short-story writer and radical innovator in modern theatre. Reading includes: *First Love*, *Fathers and Sons*, *In the Ravine*, *Ward No. 6*, and *Cherry Orchard*.
- 260A/B Russian Satire and Humour:** lecture and discussion 2 hours, no prerequisites. Conducted in English. Russian satirical and humorous literature written within the last two centuries. Russian satire and humour have made a great contribution to the world's treasures in this genre. Students read masterpieces by Gogol (*Dead Souls*) and Dostoevsky (*The Devils*). Lectures cover some of the immortal comedies of Russian literature and the early humorous stories of Chekhov. For the period after the 1917 Revolution stories by Soviet satirists, including Zoshchenko and Bulgakov, are discussed as well.
- 275A Dostoevsky and the Russian Idea:** lecture and discussion 2 hours, no prerequisites. Conducted in English. Dostoevsky's novels are of the highest importance in understanding the fate of Russia and the thoughts of other great Russian authors and thinkers. *Crime and Punishment* and *The Brothers Karamazov* are taken as the basis for discussion. The works of I. Turgenev and Lev Tolstoy are discussed together with the ideas of great Russian philosophers, like V. Solovyev and N. Berdyaev.
- 276B Dostoevsky and Western Literature:** lecture and discussion 2 hours, no prerequisites. Conducted in English. With all his love for Russia, Dostoevsky treasured the West and its literature. It is impossible to understand Dostoevsky and his main novels, including *The Idiot* and *The Devils*, without *Hamlet* by Shakespeare, *Don Quixote* by Cervantes, *Faust* by Goethe, some plays by F. Schiller, etc. The class traces the influence of Western ideas on Dostoevsky and his influence on some Western thinkers, like Nietzsche and Freud.
- 300 Advanced Russian:** lecture 3 hours. Prerequisite: Russian 200 or equivalent. Conducted in Russian. Following a thorough review, this class concentrates on expanding all aspects of the students' knowledge of Russian. Grammatical topics treated include systematization of the verb, aspect and voice, word formation, punctuation, and elements of stylistics. Soviet and emigre texts are read extensively and intensively. Discussions and compositions are based on the assigned readings and on conversational materials drawn from Soviet universities.
- 302 Russian Prose and Poetry:** lecture 3 hours. Prerequisite: Russian 200 or equivalent. Conducted primarily in Russian. Students read, translate, and critically interpret a series of the best short stories of such great Russian authors as Pushkin, Tolstoy, and Chekhov, and poems by Lermontov, Mayakovsky, Mandelstam and Pasternak. Original texts are supplied with vocabularies and grammatical notes. Texts are chosen according to the level of students' knowledge.
- 309A Soviet Society Today:** N.G.O. Pereira. (See History 3090A.)
- 301B Grammar:** (See listing under Russian Studies Program.)
- 303B Conversation:** (See listing under Russian Studies Program.)
- 305A Vocabulary Building:** (See listing under Russian Studies Program.)
- 308B Phonetics:** (See listing under Russian Studies Program.)
- 310A Intensive Russian Grammar:** (See listing under Russian Studies Program.)
- 312A Intensive Russian Prose and Poetry:** (See listing under Russian Studies Program.)
- 325A/B Literature of Revolution — The 1920's in Russian Literature:** lecture and discussion 2 hours, no prerequisites. Conducted in English. A study of experiment and submission during one of the most exciting, diverse, and frustrating periods in Russian letters. "Socialist realism" was not yet official doctrine; innovation in literature was tolerated. Writers openly

pondered the role of the individual and culture in the new collective society. Close reading and discussion of texts by Pasternak, Babel, Zamyatin, Olesha, Pilnyak, Zoshchenko, and Bulgakov.

327A/B The Russian "Heroine": lecture and discussion 2 hours, no prerequisites. Conducted in English. The strong spiritual and moral force which Russian women have exerted on their society is richly reflected in literature. The class focusses on the portrayal of several literary heroines and discusses their impact on both the literary imagination and society. Their number includes Pushkin's *Tatyana*, Dostoevsky's *Sonya Marmeladova* and *Nastasya Filippovna*, Tolstoy's *Anna Karenina*, Gorky's *Mother* and Bulgakov's *Margarita*.

333A/B The Russian Short Story: lecture and discussion 2 hours, no prerequisites. Conducted in English. On the basis of ten to twelve Russian masterpieces in the short story genre, students have a chance to trace the development in this field from Pushkin and Gogol, throughout Turgenev, Tolstoy, Dostoevsky to the best short stories of post-revolutionary writers, including I. Babel, M. Zoshchenko, B. Pilnyak, A. Platonov.

350A/B Gogol and his Tradition: lecture 2 hours, no prerequisites. Author of "Overcoat," "Nose," *Taras Bulba*, *Dead Souls*, Gogol has been proclaimed "a pathological liar and honest anatomist of the soul, jejune jokester and tragic poet, realist and fantast." An in-depth study of this major writer and his impact on the work of Dostoevsky, Kafka, Bely and Bulgakov.

400 The Structure of Contemporary Standard Russian: lecture and discussion. Prerequisite: Russian 300 or permission of the instructor. Conducted in Russian. Systematic study of the structure of Russian: analysis of special problems in phonology, morphology, syntax, and stylistics. Tailored to the individual needs of the student, with emphasis on practical applications of linguistic insights.

430 Russian Poetry: lecture and discussion. Prerequisite: Permission of the instructor. Conducted in Russian. A combination of an introduction to the theory of poetry with close analysis of masterpieces of nineteenth and twentieth century Russian poetry chosen to fit the interests of the individual student.

480A Old Church Slavonic: lecture 2 hours, Prerequisite: Russian 300. A survey of Old Church Slavonic grammar accompanied by intensive study of its canonical texts.

482B Historical Phonology and Morphology of Russian: lecture 2 hours. Prerequisite: 480A. An outline of the evolution of the sound pattern and grammatical structure of Russian from their roots in Common Slavic to the present. Representative readings from Old and Middle Russian texts.

497/498/499 Russian Special Topics: staff. Prerequisite: Permission of the Department. Conducted in Russian. Offers the student an opportunity to work with an advisor in researching subjects which are not regularly taught in the Department. Students who wish to register for a specific program should consult the chairman of the Department.

Russian Studies Program

Participating Faculty

Yuri Glazov (Professor of Russian)

Norman Pereira (Associate Professor of History)

Ieva Vitins (Assistant Professor of Russian)

John A. Barnstead (Assistant Professor of Russian, Coordinator of the Program)

The Russian Studies Program, the only one of its kind in Canada, is a special inter-disciplinary course of instruction which allows Dalhousie students (as well as students from other Canadian universities) to undertake intensive study of the Russian language, both here and in the Soviet Union. In order to participate, students must be able to demonstrate competence in the Russian language equivalent to two years of university classes (at Dalhousie these are Russian 100 and Russian 200) with a mark of "B" or better. The duration of the program is one academic year, the first half of which is at Dalhousie or some other Canadian university, the second half of which is at the Pushkin Institute in Moscow, or at Leningrad State University. Enquiries and applications should be addressed to the Coordinator of the Program.

Classes at Dalhousie, September to December

309A Soviet Society Today: N.G.O. Pereira. Conducted in Russian. See History 3090A.

310A Intensive Russian Grammar, lecture 10 hours. Soviet language specialist. Conducted in Russian. Approximately one-half of class time is devoted to grammar and reading. The remaining time is devoted to conversation and pronunciation. The class meets for five two-hour sessions each week. There is one written composition per week of 2-3 pages. The instructor works closely with individual students. This is a six-credit-hour course.

312A Russian Prose and Poetry: lecture and discussion 5 hours. Conducted in Russian. The students read, translate and critically interpret a number of the best short stories of such great Russian authors as Pushkin, Tolstoy, and Chekhov, and poems by Lermontov, Mayakovsky, Mandelstam, and Pasternak. Original texts are supplied with vocabularies and grammatical notes. This is a six-credit-hour course.

315A Russian Society, Literature and Arts: lecture and discussion 2 hours, staff. Conducted in Russian. The course, read in Russian by various faculty members, aims to provide students with necessary knowledge of Russian literature, history, fine arts, religious and philosophical ideas.

Classes at the Pushkin Institute, Moscow, January to May

301B Grammar: Intensive study of the finer points of Russian grammar. Topics include verbs of motion, aspect, impersonal constructions, government and agreement, and other themes. Six credit hours.

303B Conversation: Systematic development of conversational ability on everyday themes: transport, city services, theatre, sport, shopping, the library, the Soviet educational system, the structure of the Soviet government, etc. Three credit hours.

305B Vocabulary Building: Extensive and systematic study of the Russian lexicon: differentiation of synonyms; stylistic differences. Three credit hours.

308B Phonetics: Comprehensive study of Russian pronunciation: language laboratory training and techniques of correcting pronunciation. Three credit hours.

Sociology and Social Anthropology

Chairperson of Department
Victor Thiessen

Professors

J.H. Barkow, AB (Brooklyn), AM, PhD (Chi.)
D.H. Clairmont, BA, MA (McM), PhD (Wash. U.)
R.C. Kailf, BA (Dal), BD, MA (Tor.), PhD (McG)
L. Kasdan, MA, PhD (Chi.)
J.J. Mangalam, PhD (Corn.)
W.N. Stephens, AB (Colo.), MA (Bost.), EdD (Harv.)

Associate Professors

R. Apostle, BA (Simon Fraser), MA, PhD (U. California at Berkeley)
P.M. Butler, BA, MA, PhD (Tor.)
D.H. Elliott, BA (Yale), PhD (Pitt.)
J.L. Elliott, BA (Wells), MA (Kan.), PhD (Pitt.)
H.V. Gamberg, BA (Brandeis), A.M., PhD (Princ.)
V.P. Miller, BA (U. California at Berkeley), MA, PhD (U. California at Davis)
J.G. Morgan, BA (Nott.), MA (McM), DPhil (Oxon.)
J. Stolzman, BA (Ore.), MS (Fla.), PhD (Ore.)
V. Thiessen, BA (Man.), MA, PhD (Wis.)

Assistant Professors

M.E. Binkley, BA, MA, PhD (Tor.)
P.G. Clark, BA, MA (McM), PhD (UBC)
N.W. Jabbra, BA (U. California at Santa Barbara), MA (Ind.), PhD (Catholic)

Adjunct Associate Professors

B. Keddy, BScN (MSVU), MA (Dal), PhD (Dal), RN
B. Raymond, MA (U. California at Berkeley), PhD (Chi.)

Adjunct Assistant Professors

S. Shaw, BPE (Dal); MSc (Dal), PhD (Carleton)

Research Associate

F.C. Wien, BA (Queen's), MA, PhD (Corn.)

Sociology and Social Anthropology

This Department offers classes and programs of study in the related disciplines of sociology and social anthropology.

Sociology

As a social science, sociology seeks to apply the scientific method to human behaviour. In doing so, it makes two assumptions — that human social life exhibits regularity and recurrent patterns, and that people are essentially social animals. The sociological enterprise focusses upon social relationships, social institutions, and processes of social change. No single approach to these complex phenomena has been found adequate. As a result, a wide range of explanatory models and perspectives has evolved.

Sociology provides a context within which students learn to think critically about their social environment; become aware of the impact of social forces

on their lives and the lives of others; and develop skills of analysis useful in understanding and managing their social environment. Many students find a sociology major helpful in preparing for social work, nursing, personnel management, and other occupations dealing directly with people.

Social Anthropology

Anthropology is a diverse discipline whose branches study the human species in all of its physical, cultural, and linguistic diversity in both space and time. It consists of four sub-disciplines: Archaeology, Linguistics, Physical Anthropology, and Social or Cultural Anthropology. As a joint department of Sociology and Social Anthropology this department is committed to a program which stresses the areas of convergence between the two disciplines. The major focus therefore is upon courses in Social Anthropology, although classes in other areas may be offered.

Social Anthropology shares many theoretical and substantive interests with Sociology. It adds a strongly comparative dimension by its concerns with the complete range of human societies and cultures in all historical and geographic settings. Its primary emphasis is upon preindustrial societies and the non-industrial sectors of more complex societies. Its concern is with all levels of social and cultural integration from the family, through the band, the chiefdom, and the state. It aims at generalization by comparing structures and processes in major institutions within societies (kinship, political, economic, and religious), as well as between societies. A well-trained social anthropologist will be acquainted with overlapping areas in Sociology, just as a well-trained sociologist will be acquainted with Social Anthropology.

Career Options

Career possibilities in sociology and social anthropology include research and managerial positions in government, industry, or university, and teaching at the high school or university levels.

Degree Programs and Course Offerings

Degree Programs

The department offers a major in Sociology and Social Anthropology leading to the BA degree. It offers honours BA degrees in Sociology and in Anthropology.

BA Degree

Students enrolled in the BA (i.e., three-year) degree program must take at least four and no more than eight classes beyond the introductory level in Sociology and Social Anthropology. Depending on their interests, they may take mainly sociology classes or mainly anthropology classes, or they may combine the disciplines.

Required Classes

1. *Introductory Level* Either SSA 1000, 1100, or 1200.
2. *Theory* Either SSA 2240 A or B or SSA 2250A/B.
3. *Research Methods* SSA 2010A is required. SSA 2011B is recommended.
4. *Third Year Seminar* One class (either 2 half-classes or a full-year class) must be a third year seminar. Consult the department for a list of such classes.

Suggested Class Structure

Year I: SSA 1000, 1100, or 1200; at least one introductory class in Economics, Political Science, Psychology, History or Biology; and three other classes chosen from fields other than Sociology and Social Anthropology.

N.B. One class must satisfy the writing requirement (Arts and Science regulations, page 24.)
Year II: SSA 2010A, 2011B, and 2240 A or B or 2250 A/B; 1 ½ — 2 other courses in Sociology and Social Anthropology; and two electives.

Year III: At least one third year seminar in Sociology and Social Anthropology; two other classes in Sociology and Social Anthropology; and two electives.

Honours BA Program

Students may choose from two honours programs: Anthropology or Sociology. An honours degree is a recommended and frequently required preparation for advanced study in both Sociology and Social Anthropology. Honours programs normally consist of not less than nine nor more than eleven classes in Sociology and Social Anthropology beyond the introductory level. Each program consists of several required classes (see A and B below), other classes selected according to the student's interests, and an honours thesis.

Required Core Classes

A. Anthropology Program: 2010A Introduction to Social Research, 2011B Research Design, 2250B Introduction to Social Anthropological Theory, 2370 or 2380 Peoples and Cultures of the World, or both 2350A Native Peoples of Canada and 2360B Native Peoples of the United States, 3410 Social Statistics 4000 Seminar in Social Anthropology, and 4590 Honours Seminar in Social Anthropology.

B. Sociology Program: 2010A Introduction to Social Research, 2011B Research Design, 2240A or 2240B Introduction to Sociological Theory, 3100 Research Methods, 3401A History of Sociological Thought, 3405B Contemporary Sociological Theory, 3410 Social Statistics, and 4500 Honours Seminar in Sociology.

The Seminar paper produced in 4500 or 4590 is examined as an honours thesis. This fulfills the university requirement that a comprehensive examination covering a student's honours work be passed in order to receive an honours degree. Interested students should contact the chairman of the department's Undergraduate Education Committee, Professor N.W. Jabbra. The Committee chairman and the student select an honours adviser. Normally the adviser is a faculty member teaching in the student's subfields of concentration.

Note: For students who entered the honours program prior to 1985-86, the required core classes described in the 1984-85 calendar will apply.

Combined and Unconcentrated Honours

Combined honours programs can be arranged between Sociology and Anthropology, or between Sociology or Anthropology and some other appropriate discipline such as, for example, Political Science. Students wishing to arrange combined or unconcentrated honours programs are advised to seek the counsel of the departments involved as early as possible.

African Studies Program

The Department is cooperating with several other departments in the African Studies Program. Interested students should contact Professor J. Barkow.

Canadian Studies Program

The Department is cooperating with several other departments in offering a Canadian Studies Program. Interested students should contact Professor P. Clark.

Women's Studies Program

The department is cooperating with several other departments in the Women's Studies Program. Interested students should contact Professor N.W. Jabbra.

Sociology and Social Anthropology Classes Offered

Please Note:

All students (whether Sociology and Social Anthropology majors or not) must have SSA 1000, 1100, or 12000 as a prerequisite for any class on the 2000 or higher levels, or obtain permission from each instructor involved. There may also be additional prerequisites required. No student may

receive credit for more than one introductory level class (1000, 1100, or 1200) in Sociology and Social Anthropology.

Some classes listed may not be offered in a given academic year. Consult the timetable for details.

The department is in the process of modifying its offerings in the areas of social research, research methods, and social statistics. Consult the department for details.

1000 Culture and Society: An introduction to the comparative study of human society from the parallel perspectives of Sociology and Social Anthropology. The principal focus is on continuity and change in a variety of societies ranging from simple hunting and gathering societies to highly complex industrial societies.

1100 Introduction to Anthropology: This class introduces students to all subfields of anthropology while emphasizing the socio-cultural. Topics considered include: the variety of human cultures and societies and how they are organized and function, the relationship between ecology and culture, human evolution, nonhuman primate behaviour, principles of archaeology, and the study of languages around the world as they relate to the cultures of which they are part.

1200 Introduction to Sociology: This class introduces students to basic sociological concepts, the logic of social inquiry, and major theoretical and methodological issues in the field. Substantive course contents include the study of culture, socialization, deviance, social organizations, institutions, social roles, and demography. Emphasis is on the study of modern industrial societies with special attention given to Canadian society.

2000 Archaeology: An Introduction: This class covers the following topics: archaeology and its relationship to history and prehistory, the origins and growth of the discipline of archaeology, the application of archaeological techniques in the field of prehistory, the excavation of a site, the establishment of a chronological framework, and the reconstruction of the historical past.

SSA 2010A Introduction to Social Research: This class provides an introduction to basic research skills used by anthropologists and sociologists to investigate and analyze social phenomena. The class is organized into three modules each of four weeks duration. The first module emphasizes the effective use of existing information, with particular emphasis on library research techniques and resources. The second module provides an introduction to computers and demonstrates a variety of computer based research activities. The third module stresses the evaluation of research and provides the student with both the skills and opportunity to assess critically and professionally the work of empirical anthropologists and sociologists.

SSA 2011B Research Design: Prerequisite: SSA 2010A or consent of instructor. The class is organized around four 3-week modules, representing a survey of the major research designs employed in anthropology and sociology. Module I deals with the design of experiments and simulations; Module II examines historical and comparative research designs; Module III treats survey-based designs; Module IV examines designs based upon fieldwork and observation.

2020 Comparative Sociology/Social Anthropology: The starting point is the vision of the founding fathers of sociology that the discipline was to be a comprehensive and comparative science of society. Modern sociologists view comparative studies primarily in large scale cross-societal terms, while modern social anthropologists (equally the intellectual descendants of the founding fathers) tend to be more interested, in addition to a comparative approach, in the natural history of smaller societies, and in applying the methods learned in these to more complex societies. The first part is

devoted to a treatment of several topics from the social anthropological perspective. The second part treats the major figures and ideas in social anthropology and general sociology from an historical perspective. Student field projects are an important part of the learning process in addition to the more usual kinds of assignments.

2030 Deviance and Social Control: Groups make formal and informal rules in an attempt to regulate and make predictable the behaviour of their members. Violations of these rules occur in many different ways and stem from various causes. This class examines both the processes by which groups make rules and the reasons why these rules are violated. Specific issues such as crime, delinquency, narcotic addiction, alcoholism, prostitution, suicide, and minority group relations are discussed in this context.

2040 Social Stratification: Aspects of social inequality in modern industrial society. The formation of classes, status groups, and organized political expressions are considered. Questions of the distribution of power and wealth in society, the existence of power elites or governing classes, the impact of bureaucracy on class relations, the extent to which major economic inequalities have been reduced in this century, problems of the mobility of individuals and the groups through the stratification system and the impact on social structure are dealt with. Theoretical discussions in the class are largely concerned with the ideas of Karl Marx and Max Weber, but attention is also paid to contemporary theoretical approaches to stratification.

2050 Sociology of Religion: The relations between religious beliefs and human behaviour and social structure. Major themes include: the impact of social structure on the development of belief systems; the question of whether beliefs guide and direct human behaviour; the formal organization of the religious institution; and social psychological considerations of religious behaviour. The primary focus is on current religious movements in Canada.

2060 Social Gerontology: (Same as Nursing 4900A) A general introduction to social gerontology, in which emphasis will be placed upon the historical and philosophical development of the study of aging in Canada, theories of aging, current social and economic programs for the elderly both in Canada and to some extent cross-culturally, and various pertinent social-psychological aspects of the aging process. The class familiarizes students with some of the problems people experience as a consequence of aging in Canadian society and provides an understanding of the socio-economic factors relevant to these problems.

2070 Socialization: Socialization is the process by which a society's values and customs are perpetuated, passed along to the younger generation. This is seen as the function of certain institutions, such as the family, the churches, and the schools. These, however, require support from the larger social milieu. Our own rapidly changing society appears to be at a point of crisis in this regard. Recent social changes have undermined traditional means by which children acquire a sense of allegiance to their elders, and take to themselves the society's major values. This change is described, along with the situation of modern parents, who must train their children in the absence of certain traditional supports. This class is designed primarily for parents, for people who are working with children and youth in such fields as teaching, recreation, the social services, and medical fields, and for persons who otherwise have experience in child-care. Problems in training children for responsibility, in a modern-urban milieu, are dealt with in some detail.

2080 Communities: An examination of a wide variety of territorially based residential groups such as the large metropolitan centre, the rural village, and the intentional community. Major themes include: evolution of the modern city, urbanization, rural depopulation, ecology of the city, neighbourhood social networks, behaviour in public places, minority subcommunities, and urban planning.

2090 Youth Organizations: Based on a comprehensive survey of those organized activities for teenagers in North America which attempt to give substantial socialization experiences to the youth who participate. Organizations which offer leadership training, high school clubs and extra-curricular activities, youth programs by the churches, programs of volunteer work and paid employment, junior auxiliaries of political parties and military reserve units, hobby groups, cities' recreation departments, sports programs, summer camps and travel programs, wilderness and environmentalist groups are reviewed, along with such organizations as the Y, the Scouts, 4-H, and Junior Achievement. Cities' information offices, voluntary action centres, learning exchanges, and other systems for disseminating information about youth programs are also reviewed. Certain towns and cities are compared with respect to their offerings for teenagers. Persons who have had experience in youth work, or as teachers or parents, are especially invited to enroll.

2100 Ecology and Culture: This class deals with the way in which different environments affect how people live, relate to one another, think and organize themselves. The major focus is on how cultural choices are influenced and constrained by the relationship among ecology, technology, and how people are making a living. Examples of hunter-gatherer, horticulturalist, rancher and farmer cultures are used as illustrations. Classes are a combination of lecture and seminar sessions.

2110 Canadian Society: An analysis of selected aspects of Canadian society employing theoretical perspectives and empirical materials to develop a composite view of the society as a whole through understanding the interrelationships among its parts. Major foci include the integration and survival of Canadian society, structural change, and the management and consequences of inequality. Prospects for the future of Canada are discussed in terms of these characteristics.

2120 Minority Groups: The social status of minority groups is examined in the light of contemporary theories of prejudice and discrimination. The societal consequences of discrimination are considered with respect to their effect on both minority and majority groups. Emphasis is on an analysis of Canadian minorities.

2130 Formal Organizations: This class makes a critical study, from the comparative point of view, of theoretical models for the analysis of bureaucratic organizations. Students examine the classical, structural-functionalist, and management-science approaches to organizations. The class entails a systematic survey of the sociological literature on this subject, with special concentration on organizational structure, strategy and decision-making.

2140 Industrial Sociology: The social relations of industry at both the micro- and macrosociological levels of analysis. The class deals primarily with the productive system and attendant industrial institutions of advanced capitalist society. Major topics for investigation include the industrialization process, the social structure of industry, the development of trade unionism, and the sociology of work relationships.

2150 Mass Society: The origin of modern, post-industrial mass society. Problems associated with industrialization, cybernation, leisure, technology, and environmental degradation are examined in detail. Various attempts at solution of these problems are analyzed. The rise of the expert and of counter-cultural movements are given particular attention. Theoretical and methodological innovations for future forecasting are introduced.

2160 Sociology of Occupations: Sociological views of the occupational structure, and of the constraints and influences that bear upon persons in various occupations. During one half of the class, students are helped with personal career plans.

2170A Political Sociology: Introduces students to the major concepts and theories which inform the sociological study of politics. In addition to this general orientation, particular attention is devoted to the role of power and ideology in Western society, the interplay between economy and polity in contemporary North America, and political transformation as a social process.

2190 Sex Roles in Cross-Cultural Perspective: Taking a broad comparative framework, we examine sex roles in the contexts of daily life, of economics, politics, kinship, social stratification, religion and values, and socialization. With these data as background, we then look at sex roles in Canada and in Nova Scotia. Students of either sex are invited to take this class.

2200 Sociology of the Family: Family in one form or another is an aspect of all societies. It is the most important agent of early socialization and personality formation. The first part is devoted to a consideration of some of the cross-societal characteristics of the family in general, and of the extended family as found in traditional societies in particular. The second term is devoted to a consideration of family characteristics in urban-industrial societies, concentrating on the nuclear family with particular reference to the Canadian scene. An attempt is made to understand the processes by which family structures and functions have changed through time as societies evolved from a traditional to an urban-industrial social organization.

2220 Social Psychology: Groups influence individuals and individuals react (resist, adapt to, cooperate with, or use to their own advantage) to these influences. The processes involved in such person-group relationships are explored in a number of different settings, such as the family, mental hospitals, and universities. The class will focus on both a critical review of actual studies done and on social-psychological interpretations or theories of these findings.

2230 Psychological Anthropology: Prerequisite: Either SSA 1000, 1100, or 1200, or Psychology 1000. The overlap between psychology and anthropology. Topics include: culture and personality, culture and mental health, psychiatry in other cultures, cross-cultural differences in learning, and the evolution of human psychological characteristics. A paper is required.

2240 A & B Introduction to Sociological Theory: An introduction to some of the major approaches taken by sociologists to understand the nature of society. The early foundations of social thought are surveyed with emphasis on the emergence of sociology as a discipline in the nineteenth century. The contributions of prominent theorists — Durkheim, Marx, Mead, Spencer and Weber — are stressed. The most important sources of virtually all the varieties of sociological theories of the twentieth century are found in these thinkers. Specific contemporary approaches to be considered include functionalism, conflict theory, social action theory (including symbolic interactionism and ethnomethodology) and exchange theories.

2250B Introduction to Social Anthropological Theory: The foundations and development of social anthropology. The growth of theory in social anthropology is stressed, with special attention paid to major schools of thought and the work of prominent individuals within those schools, including Cultural Evolution and Morgan; The American School and Boas; Functionalism and Malinowski and Radcliffe-Brown; Culture and Personality; Ethnoscience; and the directions in which contemporary social anthropology points. Special efforts are made to expose students to the original writings of prominent anthropologists.

2260 Culture and Political Behaviour: Political systems examined comparatively. The relation between political and other social institutions and analysis of the organization of conflict in non-Western societies. The relation of tribal and peasant politics to national politics in developing countries seen in a comparative framework.

2270 Language and Culture: An introduction to aspects of linguistics which relate to anthropology. The history of anthropological linguistics is reviewed, with attention to North American workers in the field, including Boas, Sapir, and Kroeber. Current areas of study in anthropological linguistics are examined. The relation of language to culture is considered, drawing on examples from primitive and complex societies. Students also learn to record sounds phonetically, and to analyze the sounds and words of a language into meaningful units for the speakers of that language.

2290A Belief Systems: The study of non-Western belief systems. Emphasis is on the religion of small-scale societies, treated from the perspective of religion as a system of symbols giving meaning to the universe and one's place in it. Topics include religion as a biological phenomenon, the nature of ritual, religion and healing, religion and altered states of consciousness, sorcery and witchcraft, and religion and culture change.

2310 Ethnohistory of North American Indians: The history of Indian-White relations in North America, including the United States and Canada, from the time of the Indians' first contact with Europeans and Asians to the present. Emphasis is on presenting this history from the natives' point of view.

2350A Native Peoples of Canada: A general introduction to native cultures of Canada. Following a review of prehistory, it first considers the geographic culture areas in Canada and representative tribes in them, then considers Canadian native ethnohistory, and concludes with a consideration of contemporary native peoples.

2360B Native Peoples of the United States: A general introduction to native cultures in the United States. Following a review of prehistory, it considers the geographic culture areas in the United States and representative tribes in them, then considers United States native ethnohistory, and concludes with a consideration of contemporary native peoples.

2370 Peoples and Cultures of the World I: Each year, the Peoples class surveys the peoples of a specific geographic area. The class includes background material on geography, climate, and history. Its focus is on the people themselves, their social organizations and political, economic and kinship systems, and their problems of modernization and development. Consult the department to find which regions are to be offered in a particular year.

2380 Peoples and Cultures of the World II: See class description above.

2400 Medicine and Health Across Cultures: Every culture has its own concepts of health and nutrition, its own treatments and practices. The strengths and weaknesses of our own system grow clearer when medical anthropologists compare it with that of other societies. This class's specific topics vary from year to year but always include: native theories of the etiology of illness, transcultural vs. culture-specific disease syndromes, pregnancy and childbirth in other cultures and our own; senescence and death viewed cross-culturally, the conflict between traditional medical systems and the Western physician and hospital, patients' expectations and the medical subculture, the physician as secular priest, and food and nutrition across cultures. Special attention is paid to Canada's native and immigrant peoples.

3010A/5010A Sociology of Work Roles: Examination of structure and dynamics of management-employee relationships from a sociological perspective. There will also be consideration of horizontal relationships among workers at various status levels. Organizations to be studied include both small and large-scale work structures. Consideration of the implications of collective bargaining procedures on work roles is also included.

3020B/5020B Comparative Economic Organizations: Critical examination of the nature of economic organizations. Emphasis is on how economic activities are organized in various cultures, from primitive to modern, with particular focus on development trends. Consideration is also given to alternative and futuristic models.

3030 Social Problems and Social Policy: This class focuses on the nature of social problems and social policy in advanced industrial societies. It adopts a social movement perspective, exploring the processes whereby agitation on behalf of undesirable but remedial social conditions leads to changes in social policy. Among the areas treated in depth are crime prevention, the quality of work life, race relations, deviance, and poverty/inequality.

3060B Modernization and Development: Change, modernization, and development as distinct but related notions. Beyond examining the meanings and implications of these terms, an attempt is made to outline some of the complex processes involved in planning for national development of traditional societies. For purposes of concrete illustration, the class will focus on the problems of South Asia and appropriate areas of Canada.

3070 Human Nature and Anthropology: Prerequisite: Either SSA 1000, 1100, or 1200, or an introductory class in psychology or biology. Can anthropologists explain why we feel sexual jealousy or why we tend to follow a dominant leader in times of stress? Can the evolutionary theories explaining why we have fingerprints and flat nails explain our behavioural traits? This class reviews the fossil record of human evolution and recent developments in the theories which deal with it, in order to examine critically biological explanations of human sex differences, culture, infant behaviour, racial prejudice, altruism, aggression, and other topics.

3090 Population and Society: An analysis of the interrelationships of population and social structure. The class examines changes in size, structure, and distribution of world population in terms of the three major demographic factors: fertility, mortality, and migration, with emphasis on their social, economic, and political causes and consequences.

3100 Research Methods: A detailed survey of the basic methods of social research. The topics discussed include the construction of theory, the formulation of research problems, research designs, measurement, methods of data collection, and analytic theory testing. Special attention is given to the sample survey as one of the main methods of social science research. Practical experience in survey methods is proved through a class project.

3110 Sociology of Leisure: (same as Recreation 4491B) This class looks at the phenomenon of leisure from a sociological perspective. Emphasis is on leisure research and the application of sociological theories to the study of leisure. Topics include: the social organization of leisure; the leisure industry and the roles of the state, the mass media, culture and leisure; and leisure and disadvantaged groups, e.g., women, the elderly, the unemployed, and minority groups.

3120 Social Conflict: Introduces students to the various analytical perspectives sociologists have employed to understand the patterning and consequences of conflict in society. In this regard particular attention is devoted to the functional, coercion, and Marxian theories of conflict. This class is also concerned with conflict in contemporary society, with special reference to patterns of conflict and change in Canada.

3130 Sociology of Health and Illness: The social organization of medicine and the politics of health are examined. Particular attention is paid to environmental and occupational health issues in light of technological and social change. Epidemiological patterns of morbidity and mortality are assessed. Students are responsible for seminar presentations in areas of interest.

3140 Sociology of Mental Disorders: Mental disorders as both a social and sociological problem. Social factors in the definition, incidence, etiology, and treatment of mental disorders are examined. Societal views toward and responses to so-called mental illness are reviewed and analyzed from a sociological perspective. Other topics include the social role of the mental patient and the development of mental health policy in Canada. The class adopts a seminar format and evaluation is based primarily on essays or a term paper.

3150 Sociology of Education: The nature of human learning within its cultural context. Analysis of social learning mechanisms and processes receives major consideration.

3160 Dawn of Civilization: The processes of development of civilization in the New and Old Worlds examined from the viewpoints of current anthropological and archaeological research. The role of environment, ideology, technology, and population as causal and/or limiting factors will be examined, as well as those features which differentiate civilizations from other forms of society. Different explanations for the rise and decline of early civilizations are tested against the archaeological record.

3170 Sociology of Sport and Recreation: (same as Phys. Ed. 4490A/B) A survey course which views the interrelationships among sport, recreation, culture, and society from a sociological perspective. The course provides the student with a broad overview of selected sociocultural factors which help to explain the incidence, form, and regulation of sport and specified recreational elements in contemporary society.

3180 Issues in the Study of Society: This seminar consists of an intensive examination of a selected substantive issue within Sociology and Anthropology. Since the specific topic or research problem which receives special treatment will differ from year to year, students are advised to consult the department prior to registration.

3190 Social Movements: The general topic of unstructured group activity encompasses phenomena traditionally classified as collective behaviour incidents, as well as reformist and revolutionary social movements. Although there is considerable overlap, the collective behaviour literature tends to focus on relatively brief and spontaneous activities, like panics, disasters, and crazes, while work on social movements examines relatively more organized and enduring group activities which still fall outside the realm of normal institutions. This class investigates problems emerging from both areas of concern. Emphasis is given to relevant Canadian materials.

3200B Comparative Social Organization: The ways in which human beings organize themselves in common purpose. Examples of such ways include kinship structures, voluntary associations, role structures, class and caste systems, and networks. We emphasize pre-industrial societies and non-industrial sectors of industrial societies, placing them in a comparative framework.

3210 Continuity and Change in Rural Societies: An examination of the ways of life of the majority of mankind. The focus is upon groups making their living from primary production (farming, fishing) or artisan production. The structures developed and strategies employed at the local level as well as in situations of subordination to more powerful institutions and groups are of particular concern. The perspective taken is comparative with cases from the western world contrasted with other areas.

3220B/5220B Coastal Communities: (same as Environmental Studies 5180B) Coastal communities as a social/ecological type are examined as populations and social structures (territorial, economic, occupational, political) as they have developed in response to particular ecological and social circumstances. Various perspectives which have been applied to coastal communities are examined with regard to the contribution they may make to

understanding the dynamics of these communities. Major (though not exclusive) emphasis is on North Atlantic communities.

3240 Criminology: Crime as a form of social deviance. The significance of official crime rates is analyzed and the various forms of criminal structure and behavior are examined. The second part of the class deals primarily with societal responses to offenders, tracing the judicial and correctional processes in Canada.

3250 Sociology of Science and Letters: In the attempt to understand the reciprocal interaction between science and society we stress a comparative approach, examining science in different cultural groups and different theoretical perspectives. Various modern scientific disciplines are compared in different countries, including developing and developed countries, with differing economic and political organizations. The social organization of science is investigated through the application of modern sociological analysis (e.g. small groups and organizational sociology, theory). In particular, we focus on tensions and conflicts within the scientific community which are understood in sociological terms. We examine innovation and change within the scientific community, including the processes by which new fields emerge and new ideas are evaluated.

3250A The Development of Sociology as a Discipline: The Sociology of Sociology. What are the main reasons why sociology came to be established field of enquiry and the late nineteenth century, and why it took the form that it did? Special attention is given to the divergent paths of sociology in the United States, Great Britain, Germany, and France in order to analyze the relationship between the sociological discipline and its social context. Prior classes in the history of sociological thought and in the sociology of knowledge are advantageous.

32520 Sociology of Careers: Careers in the humanistic, social service, working with people areas receives special emphasis as do sociological studies of the unemployed. This is a seminar for graduate students and advanced undergraduate, with individualized research projects.

32521 Juvenile Delinquency: Juvenile delinquency as a form of social deviance. Current issues in delinquency are defined and analyzed from a sociological perspective. The class focuses on alternatives in delinquency, the juvenile justice system and sentencing alternatives.

32522 Penology and Corrections: Prerequisite: SBA 22130, 3240, 32521, or permission of the instructor. This class traces the difficulties of the penal system in Western societies, with particular reference to Canadian conditions. The effectiveness of current methods is assessed in terms of their aims and objectives. Problems of the evaluation of contemporary receive major consideration.

3310 Cross-Cultural Study of Socialization: In this class the student (1) is introduced to the cross-cultural research method, and (2) becomes expert on the ethnographic database on one of the world's major culture areas as if it were a problem. The student writes at least one major paper, and participates in one or more (probably two) cross-cultural investigations.

3320 Time and Society: The organization and utilization of time in human societies. We examine several attempts by social scientists to develop theories (and perhaps revise them) through the empirical examination of patterns and variables of time use in different societies and cultures. We study time preferences and developed societies and utilize both anthropological (e.g. ethnographies) and sociological data (e.g. surveys). The class is conducted as a seminar with discussion of assigned readings and class reports dealing with assigned readings. Students must participate regularly in the seminar and make oral presentations of their research papers. One or two short research papers are required in the first half year, with a major paper due in the spring. Topics for these papers are developed in consultation with the

instructor. The final class grade is based on the following criteria: Seminar presentations and discussion (25%), short papers (25%), and a major paper (50%).

3401A History of Sociological Thought: Selected theorists in the history of sociological thought. Students make one oral presentation and present a written report at the end of the term.

3405B Contemporary Sociological Theory: A number of recent theoretical developments in sociology are critically examined. The choice of specific theoretical topics is left up to the instructor.

3410 Social Statistics: The logic behind a statistical approach to the solving of problems is emphasized in this class. A step-by-step unfolding of statistical reasoning is presented in the lectures. Students then apply these steps to an analysis of some sociological data. The resulting analysis is written in several drafts of the same paper. An appreciation of the interplay among methods, theory, and statistics is emphasized. A grasp of Grade 9 algebra is assumed.

4010 Seminar in Social Anthropology: Offered sporadically, this seminar is designed to allow small groups of students to pursue a particular area in social anthropology for which no regular course is offered. The topic and requirements for the class are jointly decided by the students and the professor involved.

4510 Honours Seminar in Sociology: Oral presentation on selected theoretical and research topics is made in seminar and finally completed as a written paper. Topics are selected to fit the specific needs of individual students' research projects.

4520 Honours Seminar in Anthropology: This class carries two credits. The student writes an honours thesis under the supervision of his principal adviser.

4520A Readings in Sociology: Prerequisite: Written permission of instructor. In a reading class the student is assigned to a member of staff for regular meetings to discuss readings in a selected area. Papers and research projects are expected.

4520B Readings in Sociology: Prerequisite: see 4520A.

Spanish

Chairperson of the Department
S.F. Jones

Professors

S.F. Jones, B.A. (Benn.), M.A. (Calif. Berkeley), Ph.D. (Harv.)
A. Ruiz-Salvador, B.A. (Barcelona), M.A., Ph.D. (Harv.)

Associate Professor

J.E. Holloway, B.A. (Mc. Cobb.), M.A. (Monting), Ph.D. (Duke), Acting Chair
J.W. Kirk, B.A. (Steff.), M.A. (Queens), Ph.D. (UBC)

After Chinese and English, Spanish is the most widely spoken language in the world. It is the native tongue of well over 300 million people living in 22 countries.

Spanish-speaking nations are making international headlines and students of political science, economics, commerce, sociology-anthropology, literature, history, and other academic disciplines feel increasingly interested in this area of the world. Students from these departments are welcome to take our classes on Spanish and Latin American culture, civilization, history, and politics. These classes are conducted in English, the reading is in translation, and there are no prerequisites.

Knowledge of the Spanish language will be useful to all Canadians seeking careers as members of the foreign service, business, interpreters, translators, teachers, professors, critics, editors, journalists, and many others. Our beginning language course especially emphasizes conversational Spanish.

It is a widely recognized fact that some of the best novels and poetry are coming out of Latin America today, providing stimulating and challenging material for many of our literature classes.

If your tastes and abilities lie in the direction of Spanish or Latin American studies, you should consider the possibility of taking Spanish as an area of concentration in a General Bachelor's degree course, a Bachelor's degree with Honours in Spanish, or with Honours in Spanish and another subject combined. An undergraduate concentration in Spanish, followed by training in Administrative Studies, for example, could lead to a variety of possible careers in the Spanish-speaking world in international business and public service.

The Salamanca Program at the Colegio de Espana

The Salamanca Program is a special inter-disciplinary course of instruction designed to allow Dalhousie students to undertake both an intensive study of the Spanish language and courses in Hispanic culture. In order to participate, students must normally have completed Spanish 2010B with at least a standing of 'B.' The program takes place during the fall, lasts for one term, and is offered at the Colegio de Espana in Salamanca, Spain. Dalhousie University will grant 2-½ credits to those students who successfully complete their courses in Spain. Enquiries and applications should be addressed to the Coordinator of the Program.

Spanish Studies to be taken at the Colegio de Espana

Spanish 3100A Advanced Grammar: (1 credit)

Spanish 3120A Spanish Art: (½ credit)

Spanish 3140A Spanish Literature: (½ credit)

Spanish 3160A Spanish History: (½ credit)

Spanish Degree Programs

Bachelor's Degree

Course should consist of at least four full-credit upper level classes taken in the second and third year, four of which must be conducted in Spanish. Any student who wishes to deviate from these basic requirements should consult the Department Chairman.

Bachelor of Arts with Honours in Spanish

Course should include:

Year I: Spanish 1020; Spanish 1100, 1110; and three electives.

Year II: Spanish 2000, 2010, 2500, 2510, plus two other 2000 level classes; a class in the minor subject; and one elective.

Year III: Spanish 3020, 3030, plus two other 3000 level classes; a class in the minor subject, and an elective in a subject other than that of the previous year.

Year IV: Three Spanish classes to be chosen from the upper-level program; and two electives (may be Spanish).

In addition, students are required to write an Honours essay, in Spanish, supervised by a member of the Department.

Bachelor of Arts with Combined Honours in Spanish and Another Subject

Programs may be arranged by consultation (as early as possible) with the departments concerned.

Notes

(1) The "other" classes chosen as electives in the programs outlined above must satisfy general degree requirements.

(2) Combinations of classes other than those set forth above may be chosen after consultation with the Department Chairman.

(3) A student may, with the permission of the Department, be admitted to a Spanish course at an advanced point because of prior knowledge of the language. Such a student, however (except as he may be granted transfer credits in the usual way), must normally take the same total number of classes as other students in the same course.

Classes Offered

Classes marked * are not offered every year. Please consult the timetable on registration to determine if this class is offered.

1020R Beginning Spanish: staff, discussion and conversation 6 hours, language lab as needed. For students with no knowledge or only a slight knowledge of Spanish. For students wishing to achieve proficiency in spoken and written Spanish. *Spanish One*, a textbook written and taught by members of the Department, avoids the usual chalk-and-blackboard dialogues often used in the classroom. Instead, it deals with the kinds of topics and controversial subjects that people in Spanish-speaking countries are likely to discuss: the pros and cons of going to university, the success and failure of marriage, the generation gap, women's lib, the population and pollution crises, and other items of human and social interest.

1100A/B Spanish Civilization: Ruiz Salvador, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. Although it may sound self-evident to Canadian students, this class deals with Spain and the Spaniards. What Spain is and who the Spaniards are, however, may not be that clear-cut for Spaniards themselves. This class is a search for Spain throughout her history (Roman, Arab, Jewish, and Christian Spain), her art, literature, four main languages, and customs. The goal is a clearer picture of one of the most perplexing components of Western Civilization.

1110A/B Latin American Civilization: Kirk, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. The aim of this class is to provide the non-specialist with a basic understanding of this complex — and fascinating — world area. The first half of the class examines the development of Latin America from pre-Columbian times to the Mexican Revolution. In the second half, by means of a careful study of selected texts, the class examines the way in which the reality of Latin America has shaped a continental cultural identity, producing one of the most dynamic, "readable" world literatures.

2000A Intermediate Spanish: staff, discussion and conversation 3 hours, language lab as needed. This class continues the work done in *Spanish One*. Supplementary reading as necessary.

2010B Reading and Conversation: staff, discussion and conversation 2 hours. Emphasis is on perfecting conversational skills as the reading material is discussed in class.

***2070A/B Area Studies on Mexico and Central America:** Kirk, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. Following an examination of the Indian heritage, and the colonial legacy of the *conquistadores*, the class deals principally with the contemporary period, examining the Mexican Revolution and its aftermath, Petroleum Power, the Somoza dynasty, Nicaragua under the Sandinistas, the U.S. role in the region, the human rights situation in Central America, the current El Salvador crisis, and probable developments in the region. The class is designed to provide an understanding of the contemporary reality of this volatile region, in many ways a microcosm of the crucial situation of Latin America as a whole.

***2080A/B The History of Modern Spain:** Ruiz Salvador, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. This course focusses on four main historical periods: the Republic of 1931, the Civil War (1936-1939), General Franco's Spain (1939-1975), and the post-Franco Restoration of the Monarchy.

***2090A/B Women in Latin America:** Jones, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. This class has four main objectives: (1) to examine critically, assumptions about women held by the major academic disciplines; (2) to test these assumptions in the perspective of current research and individual experience; (3) to study traditional and changing sex roles in Latin America, with particular emphasis on Cuba; (4) to explore new alternatives for men and women in our society.

***2110A/B The Cuban Cultural Revolution:** Kirk, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. Cuba, the only Communist society in the Western Hemisphere, has undergone a dramatic political and economic transformation. The Revolution has also brought about changes in education, the arts, the role of women, race relations, and athletics. The class focusses on the problems and achievements of the Revolution, the peculiarities of Communism in a Caribbean society, and its effect on literature and the arts.

***2120A/B The Spanish Inquisition and its Challengers:** Jones, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. During the time of the Reformation, many Spanish thinkers came to believe that the Church had long since failed to interpret correctly and teach effectively Christ's message. The Church had become a powerful institution, and viewed the criticism as an attack on its authority. It responded by persecuting the dissenters and organizing a movement later known as the Counter Reformation. This class attempts to examine the process by which ideas eventually may become distorted when they are institutionalized, and the methods by which progress and change can come about in spite of the efforts of the establishment to repress dissension.

***2130A/B Latin American Dictators in the Novel:** Kirk, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. The history of Latin America since Independence has been characterized by the rise to power of countless dictators. Some of the best Latin American novels portray these almost mythical figures who to this day wield absolute power in many countries. The class examines the literature and history of this phenomenon with particular attention to the twentieth century, and attempts to discover its roots in militarism, underdevelopment, and imperialism.

***2200A/B Literature of the Spanish Civil War:** Ruiz Salvador, lecture and discussion 2 hours, conducted in Spanish. A study of representative works.

***2210A/B The Novel of the Mexican Revolution:** Kirk, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. The Mexican Revolution (1910-1917) is the first people's revolution of the twentieth century. The prerevolutionary situation, the war, and its aftermath, resulted in some of the finest Latin American novels. This class views these works against the historical and social background of contemporary Mexico.

***2220A/B Masterpieces of Spanish Theatre:** Jones, lecture and discussion 2 hours, conducted in English.

***2230A/B Contemporary Latin American Prose:** Holloway, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. This class samples short stories and novels of contemporary prose from throughout Latin America. Included are works by such outstanding experimental writers as Julio Cortázar, Juan Rulfo, Carlos Fuentes, Alegjo Carpentier, Garcia Márquez and José Donoso — authors whose vigorous narrative, technical innovation and synthesis of surrealism, myth, and magical realism evidence not only a "new consciousness" in Latin America, but perhaps a rejuvenation in prose art of global consequence.

2500A Introduction to Spanish Literature: Ruiz Salvador, lecture and discussion 2 hours, conducted in Spanish. Study of illustrative works.

2510B Introduction to Latin American Literature: Holloway, lecture and discussion 2 hours, conducted in Spanish. Introduction to major authors and trends in recent Latin American literature. Study of illustrative works.

3020A/B Translation: staff, lecture and discussion 2 hours. Exercises in translation from Spanish to English and from English to Spanish.

3030A/B Composition: staff, lecture and discussion 2 hours. Training towards accuracy in writing Spanish. Vocabulary building, free composition.

***3070A/B Contemporary Latin American History:** Kirk, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. This class examines the underlying structures of Latin America through a consideration of the major political and social trends in the continent. After a brief historical overview it studies both general currents (e.g. the Church's role, militarism's growth, and U.S. influence) and specific developments, such as the Mexican and Cuban Revolutions, Petroleum Power in Mexico, Chile under Allende and Pinochet, and the Sandinistas' Nicaragua. This helps the student understand the present-day reality of this important world area.

***3200A/B Cervantes:** Jones, lecture and discussion 2 hours, conducted in English, no prerequisites. Open to students in all departments. No knowledge of Spanish necessary. This class examines Cervantes' philosophy of life through an analysis of his great masterpiece, *Don Quixote*. In this precursor of the modern novel, Cervantes studies human nature in all its many aspects. Life is presented as a complex and ironic interplay of idealism and disillusionment, appearance and reality, chivalrous love and worldly love. All truth is relative, but the ultimate irony is felt by the reader himself who discovers, in the end, that Don Quixote's view of the world is superior to that of all the "sensible" people who judged him to be mad.

***3210A/B Borges:** Holloway, lecture and discussion 2 hours, conducted in Spanish. The Cervantine tradition of fiction dealing with a problematical reality persists in twentieth century Hispanic literature, and its most noted

continuator is Jorge Luis Borges. Renowned for his fantastic, metaphysical short stories, Borges is one of the leading figures in contemporary world literature, and perhaps the greatest living writer in the Spanish language. This class serves as an introduction to his work and its relationship to the currents of contemporary literature and thought which inform it.

***322DA/B Galdós:** Ruiz Salvador, lecture and discussion 2 hours, conducted in Spanish. A liberal thinker who studiously confronted the social conditions of his day and sought to counteract the prejudices of a formalistic, authoritarian society, Benito Pérez Galdós (1843-1920) was Spain's foremost socio-psychological novelist, or, perhaps, literary social psychologist. Pre-eminent in his own country, Galdós must also be considered one of the most vital and representative novelists of the nineteenth century in Europe. This class focuses on *Fortunata y Jacinta*, his masterpiece.

***350DA/B Contemporary Spanish Literature:** Ruiz Salvador, lecture and discussion 2 hours, conducted in Spanish. A study of representative works.

***351DA/B Contemporary Spanish American Literature:** Holtoway, lecture and discussion 2 hours, conducted in Spanish. A study of representative works.

398DA Reading course for majors

3990B Reading course for majors

***404DA/B Advanced Style and Syntax:** staff, lecture and discussion 2 hours.

***450DA/B Golden Age Theatre:** staff, lecture and discussion 2 hours.

***451DA/B Golden Age Poetry and Prose:** staff, lecture and discussion 2 hours.

498DA Reading course for Honours students

4990B Reading course for Honours students

Statistics

Information on the honours program in statistics and descriptions of the statistics courses offered can be found under the Mathematics, Statistics and Computing Science entry of the Calendar.

Theatre

Chairperson of Department
P. Perina

Professor
A.R. Andrews, BA, Dipl. Ed., WFA (Leeds), PhD (Ill) FRSA

Associate Professors
R.G. Merritt, AB (Corn), WFA (NCar), PhD (Tul)
P. Perina, WFA, Dipl. Stenography (Prague)
David Overton, BA, WFA (WBC), PhD (Calif)
P. Young, BA (Tor)

Assistant Professor
R. Doyte

Lecturer
B. Zatzman, BA, WFA (Tor)

Part-time Faculty
A. Murphy
P. Richards

Special Instructors
Katherine Andrews
Francine Boucher
John Durnsworth
Bruce MacLellan (Light and Sound)
David Porter (Properties)
Ian Pygott (Technical Direction)
Ginette Rozon (Costumes)
Lynn Sorge (Costumes)
Ian Thomson (Construction)
Dorothy Ward
Mary McMurray

Theatre is a rich, complicated performing art that involves refined creative work in many different fields.

The Dalhousie Theatre Department offers different ways to study the theatre: (1) You can undertake programs that lead to a university degree: an Honours BA (4 years), a General BA (3 years); (2) You can enroll in a training program in costume studies that leads to a Certificate (2 years), a Diploma (3 years); (3) You can select certain theatre classes to reinforce and complement your studies in other disciplines offered by the university; (4) You can enroll in one class, from a special group, as a part-time or extension student.

Basically, the degree programs involve a curriculum of theatre classes, and a selection of other classes in different disciplines. The university has a set of regulations which specify how these programs must be arranged. These regulations are all listed earlier in this calendar, and prospective students should refer to them to become aware of the opportunities offered. There are a surprising number of different ways to arrange one's studies; what we recommend is the basic structure you should follow if theatre is your primary interest.

Degree Programs

BA with Honours in Theatre (4 years)

Students who wish to follow a program of theatre studies that keeps the

whole of the theatre in perspective choose this program. They must maintain a high scholastic level of performance to remain in this program (B- or better in all classes.) Only theatre classes are listed.

Year 1: Theatre 1000, 1050.

Year 2: Theatre 2000, 2010, and choice of 2100A/B, 3100A/B, or 2700.

Year 3: Theatre 3000, 3500 and choice of 3400, 3600, or 4200.

Year 4: Theatre 4900 and choice of two of 4200, 4700, 4710.

BA with Combined Honours (4 years)

It is possible to follow a program of studies that leads to Combined Honours in two subjects. Students interested in constructing such a program should start by seeing both Chairmen of the disciplines they wish to combine. From that point a suitable program can be constructed.

BA with Honours in Theatre (Acting) (4 years)

If accepted as a result of audition you pursue the following program. In this calendar we just list the theatre classes (which over four years must amount to at least eleven, though you may choose to take thirteen).

Year 1: Theatre 1500, Theatre 1050, plus three classes in other subjects.

Year 2: Theatre 2010, Theatre 2800/2810/2820, plus one class in other subjects.

Year 3: Theatre 3800/3810/3820 and 3500 or 2100A/3100B, plus one class in other subjects.

Year 4: Theatre 4800/4810/4820 and 4900, plus one class in other subjects.

BA with Honours in Theatre (Scenography & Technical Scenography) (4 years)

People from very different backgrounds are attracted to the study of scenography. Students with considerable art school or architecture background are offered especially tailored programs, and should contact the scenography professor to work out a suitable program of studies in scenography. Students starting with a keen interest and little formal background in art or architecture are admitted if they meet the university entrance requirement, and should then plan to follow the following program:

Year 1: Theatre 1000, 1050; plus three classes in other subjects.

Year 2: Theatre 2010, 2700, 2060; plus two classes in other subjects (2100A/B recommended option).

Year 3: Theatre 3060; plus three of 2000, 2100A/B, 3100A/B, 3400, 3500, 3710, 4200; plus one class in another subject.

Year 4: Theatre 4900; plus two of 3600, 4200, 4700, 4710; plus two classes in other subjects.

Students wishing to pursue the scenography specialty are urged to make an appointment with the scenography professor before they register to ensure they plan their specific program in line with their particular needs.

BA with a Major in Theatre (3 years)

You can take a "major" in theatre in a three-year BA program (15 classes). This requires at least four and not more than eight theatre classes beyond the 1000-level.

Year 1: Theatre 1000, 1050; plus three other classes of your choice.

Year 2: Theatre 2010; plus up to three of 2000, 2100A/B, 3100A/B, 2700; plus elective(s).

Year 3: Up to four of 3000, 3400, 3500, 3600, 4200; plus elective(s).

Combined BA/BEd

The Theatre Department in conjunction with the Education Department offers a 4-year program leading to the BA and BEd degrees. The outline of this program is as follows:

Year 1: (5 Credits) Theatre 1000, Theatre 1050, an approved writing class (1 full credit), introductory class in minor area* (1 full credit), and Arts and Science elective (1 full credit).

Year 2: (5 Credits) Theatre 2000, Theatre 2060, further classes in minor area* (2 full credits), ½ credit class in educational foundations, ½ credit Arts and Science or other elective.

Year 3: (6 Credits) Theatre 3000, Theatre 2010, further classes in minor area* (2 full credits at 2000+ level), two ½ credit classes in educational foundations, and one credit arts and science or other elective.

Year 4: (6 Credits) Education 4620, one credit class in Field Experience, one credit in methods area (elementary option: 2 credits), one credit in special education, ½ credit class in educational foundations, further class in minor area* (1 full credit), and ½ credit Arts and Science or other elective.

*The minor area must be a recognized teachable subject.
For further information, consult the Theatre Department.

Costume Studies, Certificate in 2 years, Diploma in 3 years

This professional program is designed for the student whose goal is the professional theatre or the fashion industry. Admission is normally by meeting the university entrance requirement. Students in this program do not have to take classes outside of theatre. Students are required to work on departmental productions as a means of gaining proficiency in garment assembly. In order to maintain a harmonious student/teacher relationship only twenty-five students will be enrolled in the first year, fifteen students in the second year and five in the third year. The third year prepares the student for professional work, either in the fashion industry or in the theatre.

Facilities

The department is located in the theatre wing of the Dalhousie Arts Centre. The theatre wing is a self-sufficient unit involving one proscenium theatre, two studios, and supporting workshops.

The department is developing close collaboration in certain theatre work with the Neptune Theatre and other regional theatres.

Some theatre classes by the nature of the work involved have a restricted enrollment. All students wishing to take any class in theatre should therefore first consult with the department.

Please note: Theatre by its nature requires evening work. Students, especially in acting, scenography, and costume classes, are advised not to undertake evening work or classes.

Classes in the Degree Program

Year 1

1000 The Nature of the Theatre: 3 hours, Merritt, Overton and Zatzman, 6 credit hours. This class provides an introduction to the nature of the production process and theatre through lectures, discussion, demonstration, script analysis, and practical scene work.

1050 Theatre Organization and Stagecraft: lecture 2 hours, labs and work in productions 3 hours, Perina and staff, 6 credit hours. An introduction

to theatre production, providing initial contact with scenography. Basic theatre construction, common materials used for construction, stage properties and costumes, knowledge of basic theatre lighting and sound equipment, and the methods and procedures for working with all of them efficiently, creatively and safely make up the substance of this class. Students who intend to enrol in the theatre honours program must take this class. It is also a prerequisite for the scenography classes. Because of the required evening production work, those enrolling in this class must avoid permanent evening commitments other than departmental theatre activity during the academic year. There are certain lab charges connected with this class.

***1300 Introduction to Film:** 3 hours, Merritt, 6 credit hours. This class considers aspects of film history and theory, but its primary emphasis is on film criticism. Some films are presented in class, but students are also required to attend films presented at the Regional Film Theatre and elsewhere. The class presents reviews of films and considers such specific aspects as directing, acting, cinematography, editing, imagery, and screenwriting. The intent of the class is to provide an overview of the nature of film, its effect on the public as a mass medium, and its dual role as both an art form and a commercial entertainment.

1500 An Introduction to Theatre Studies (Acting 1): 6 hours, Young and acting staff. Prerequisite for Theatre 2800. Entrance to the class is by audition only. The first year in a course designed for the student interested in a professional acting career. The class concentrates on opening up and developing the emotional and imaginative range of the student through a series of improvisational and textual exercises. There is also concentration on the development of vocal and physical techniques for the actor. Emphasis is also placed on the discipline necessary in the professional theatre.

Year 1

2000 Theatre Performance: 1, 4 hours, Overton, 6 credit hours. Prerequisite: Theatre 1000. Designed to provide exposure to the production/performance process for those who do not intend to pursue a career in the professional theatre. Through a workshop/discussion approach, basic performance problems are considered and the student is given the chance to experiment with various solutions in a performance situation. The ability to articulate solutions both verbally and nonverbally is developed. The class may result in a public performance.

2010 The History of the Theatre: lecture, discussion, demonstration 3 hours, Andrews, 6 credit hours. Prerequisite: 2nd year student. A basic and comprehensive understanding of the development of theatre and drama. Emphasis is on the crucial phases of that development: the classical theatre of Greece, the theatre in the mediaeval period and in the Renaissance, and the rise of the modern theatre. This class is required for all students, majors, and in the honours program, and is recommended for others who are in the second year of their university course. Text: O.G. Brockett, *History of Theatre* (4th Edition).

***2020 Modern Dance:** 4 hours of movement, Richards, 6 credit hours (summer session only). The theories and techniques of modern dance; the use of space, rhythm, dynamics, kinesthetics, aesthetic awareness and composition. The development of personal expression through the medium of dance is also encouraged within the class.

2060R Technical Scenography I: 6 hours, Perina *et al*, 3 credit hours. Prerequisite: Theatre 1050. This class is concerned with the progressively more complex problems of the preparation of theatre production in lighting, sound, construction, photography, and properties. The theory behind the operation of these crafts, the advances in technology and their expense and adaptability, forms part of this class. Lecture periods are concerned with Stage Management, Technical Drawing, Theatre Organization and Administration as well as other related topics. Workshop preparation in light and sound,

darkroom, properties, and construction is integrated with crew responsibilities in department productions. There are certain lab charges connected with this class.

***2100A or B Dramatic Structure:** 3 hours, Merritt, 3 credit hours. Prerequisite: First year writing requirement. The analysis of plays as vehicles for performance, involving a detailed study and comparison of specific dramaturgical problems and the way they have been handled by various playwrights. Specific problems such as expository material, rhythmic/dramatic structure, and the orchestration of audience response are dealt with. The plays studied are drawn from a wide range of genres, styles, and historical periods.

2700 Scenography I: 6 hours, Perina, 6 credit hours. Designed to give students basic visual judgement and understanding. In the first half, it follows the Bauhaus approach to graphic design but adapts it to the needs of three-dimensional theatre space. In the second half the class teaches perspective; the final project is to integrate all the previous material and apply it to simple stage composition. Throughout the year analysis and criticism of various works are encouraged. The texts followed are Gyorgy Kepes' *Language of Vision* and Johannes Ihen's *The Elements of Colour*. Students wishing to take this class should consult with the instructor.

2800/2810/2820 Acting II: 15 hours, Young and acting staff, 18 credit hours. Prerequisite: Theatre 1050, and a grade of at least C in Theatre 1500, and permission of instructor. The second year of the actor training course. The concentration is on the development of textual, vocal and physical techniques for the actor. In the acting classes there is work on a series of scene study exercises utilising the emotional and imaginative work started in the first year. Added to this year are sections in makeup, mime, singing, yoga and dance techniques for the actor. The student is required to perform two or more roles in major or minor productions.

Year 3

3000 Theatre Performance III: 4 hours, Overton, 6 credit hours. Prerequisite: Theatre 2000. An exploration of the production/performance process on a more sophisticated level than Theatre 2000. Some performance experience is assumed among the participants, and the emphasis is on developing and refining performance skills. The class may result in a public performance.

3060R Technical Scenography II: 6 hours, Perina and staff, 3 credit hours. Prerequisites: Theatre 2010, 2060 and 2700. An advanced class in production technology. Students work intensively in one of the areas of: construction, properties, lights and sound, or stage management. Lecture periods are devoted to Administration, Publicity, Advanced Techniques, and other related topics. Lectures are common to all students. Each student serves as crew head for at least two departmental productions. There are certain lab charges connected with this class.

***3100A or B Practical Theatre Criticism:** 3 hours, Merritt, 3 credit hours. Prerequisite: Theatre 2100A/B or permission of instructor. The class is concerned primarily with the relationship between the critic and the play in performance. Some of the theoretical bases of criticism are considered, but the emphasis is on ways in which critics and critical theories can have a positive effect on the modes, methods, and styles of theatre production.

***3400 Seminar on Playwriting:** 2 hours, Murphy, 6 credit hours. A detailed study of plays for stage, radio, television and film. It deals with the purely creative play and that based on history or the novel. Material is drawn from modern classical plays, and from works of the teacher, from first notes to final draft, which have been produced in the various fields. The techniques of character development and plot construction, etc., are considered in depth. Playwriting submissions of the students are analysed and discussed.

3500 The Modern Theatre: 3 hours, Andrews, 6 credit hours. Prerequisite: Theatre 2010 or permission of instructor. The modern theatre has been characterized by successive bursts of creative energy and experiment. This class gives an opportunity to study these developments in detail and to examine several important theatrical theories. Their implementation in particular plays and in theatrical practice is also examined.

***3600 The Playwright in the Theatre:** 4 hours, Merritt, 6 credit hours. Prerequisite: Theatre 2100A/B. The play as a vehicle for performance rather than as a literary work. Through weekly writing exercises dealing with specific dramaturgical problems, the craft of playwriting is explored. Simultaneously, a basis for understanding the nature of dramatic forms is provided through detailed analysis of the structure and techniques of plays representing a broad spectrum of styles, genres, and historical periods. With this background, the class then writes plays (both individually and collaboratively) which are then revised, critiqued, given a public presentation, and rewritten.

***3710 Scenography:** 6 hours, Perina, 6 credit hours. Prerequisites: Theatre 2010, 2060, and 2700. For theatre honours and special scenography students only. It builds on the knowledge from the previous class in the field, Theatre 2700, as far as visual knowledge is concerned, and from technical knowledge acquired in Theatre 2060. Students concentrate on learning in more detail about three-dimensional theatrical space, its dynamics and composition. At the same time, they learn technical drawing for the theatre and the methods of executing constructionally a designed work. They are introduced to the directorial/scenographic relationship. The texts followed are John R. Walker's *Exploring Drafting: Basic Fundamentals* and Willis Wagner's *Modern Woodworking*.

3800/3810/3820 Acting III: 15 hours, Young and acting staff, 18 credit hours. Prerequisite: Theatre 2010, class in dramatic literature, a grade of at least B- in Theatre 2800/2810/2820; permission of instructor. The advanced class in the acting course. Added to the core acting, voice, text and movement sections are sections in gymnastics, fencing, solo singing and audition techniques for the actor. The student is required to perform four featured roles in major productions.

Year 4

4620 (Theatre 4200) Developmental Drama: 3 hours practice, Zatzman, 6 credit hours. A class which shows anyone involved or interested in the development of children how drama can be used both to guide personal development and to heighten learning ability. The class considers how best to adapt developmental drama to school situations. Improvisation, theatre games and dramatizations of social issues make up part of the class; various approaches to drama in education are considered. Regular practice runs through the class, and each student must develop individual practical workshops.

***4600 Directing:** 4 hours, 6 credit hours. Prerequisites: Only available to honours theatre students who have taken Theatre 1050, 2010, 2700, 2800/2810/2820 or 2000, and 3600. The procedures that lead to theatrical events are analysed. Requirements include the directing of scenes from plays, and at least one fully achieved production. The class is normally only available to honours theatre students in the fourth year of their program.

***4700 and *4710 Special Topics, Faculty:** 6-12 credit hours. Prerequisite: Permission of department. The student explores in detail particular areas of the theatre of special interest, with the guidance of members of the faculty. Frequency and the length of meetings are decided to meet the needs of the particular topic or project under study. The class is open only to fourth-year honours theatre students.

***4800/4810/4820 Acting III:** Young and acting staff, 6 credit hours. Prerequisite: Theatre 3800/3810/3820 and consult departmental chairman. An

advanced class in exercises and scene study, as well as interview and audition techniques.

***4900 Dramatic Theory and Criticism, and the Aesthetics of the Theatre:** 4 hours, Andrews, 6 credit hours. Prerequisites: Theatre 2010 and 3500. All of the arts face a profound problem in the attempt to establish criteria for evaluating creative activity. This class tackles that problem in the theatre. It looks at the various hypotheses and critical strategies that have been devised hitherto, and attempts to judge their present worth. It also asks what critical values are necessary for the survival and future growth of the theatre.

Classes in Costume Studies

These classes make up an entire program. They are not available for credit towards degree, i.e. BA programs. Students accepted for the Costume Studies program concentrate their work solely on these classes, plus Theatre 1050 in the first year and Theatre 2010 in the second (if continuing to third year).

Year 1

1750 Costume Studies I: 4 hours daily, Doyle and staff, 30 credit hours. prerequisite: Permission of the instructor. A basic outline of the history of costume; a history of textiles; pattern drafting; a designer's method for the media; and practical costume construction. There are certain lab charges connected with this class.

Year 2

2750 Costume Studies II: 4 hours daily, Doyle, visiting professional designers and staff, 30 credit hours. Prerequisite: Theatre 1050 and 1750; permission of the instructor. This covers advanced pattern drafting; decoration techniques; millinery; costume accessories; the wearing of costume; and costume making. There are certain lab charges connected with this class.

Year 3

***3750 Costume Studies III:** In residence and professional theatre apprenticeship, Doyle, 30 credit hours. Prerequisites: Theatre 1050, 2010, and 2750; permission of the instructor. On the basis of outstanding performance in the first two years, five or six students are selected for the third year. During this year, these chosen students are responsible for the total production of costumes required for use within the theatre department. It is intended that during part of this year the student is placed under the supervision of the Costume Studies director to assist in bridging the gap between student projects and the profession. During this year, these students learn to direct and supervise hired staff within the specific needs of today's professional theatres. They also learn all aspects of budgeting related to costume design and manufacture for major stage productions. There are certain lab charges connected with this class.

Transition Year Program

In 1982, the Transition Year Program became a department in the Faculty of Arts and Science. It is a special one-year program designed for Black

and Native students who have not yet developed all the skills needed for university-level study and may not yet meet standard entrance requirements.

While preparing its members for admission to regular programs at the beginning of their second year on campus, the Program introduces students to the University in a variety of ways. Its curriculum, which includes a variable number of credit courses, can be adapted to individual needs and objectives. Most students take courses in Black and Native Studies, Student Skills, English and Mathematics. They also choose a regular first-year elective that is of personal interest to them. Classroom instruction is complemented by an orientation week, special lectures, tours, workshops, field trips and counselling.

The Program's staff are drawn from the Dalhousie University Community as well as the Nova Scotian Black and Native Communities. Guest lecturers come from all parts of the world.

Black, non-status Indian and Metis students accepted into the Program are eligible for comprehensive bursaries during their transition year. If they successfully complete this qualifying year, they become eligible for continued partial support as long as they remain in good academic standing and progress towards a first degree.

Status Indian students attending the Program are fully funded through the Department of Indian Affairs' "University and College Entrance Preparation Program."

Although enrollment is limited to ensure that each student receives considerable personal attention, highly motivated Native and Black students of all ages and educational backgrounds are encouraged to apply. The TYP welcomes applications from students who did not complete high school or the courses required for university entrance, students who completed a general or mixed high school program and those who, although they may have received low grades in any type of program, can demonstrate intellectual potential in other ways.

The Program has no absolute entrance requirements. Admission criteria are flexible, and the Admissions Committee considers each case comprehensively on its own merits. The candidate's overall maturity and seriousness of purpose are vitally important.

For further information or application forms, please contact:

Dr. Karolyn Waterson, Director
Transition Year Program
Dalhousie University
Halifax, N.S.
B3H 3J5
Telephone: (902) 424-3730

Deadline for receipt of applications for the following September:
February 1st.

Women's Studies

Although there is at present no program in Women's Studies, the following classes are offered at Dalhousie University and may be taken as electives or form part of a major program. For further information consult the Department under which they are listed. A BA program in Women's Studies was approved by Senate and awaits approval by MPHEC.

Comparative Literature 215R Women in Literature & Society

Education 4020 Gender Roles

History 3350A Family & Community

History 3610A/B Women in Capitalist Society

History 3612A/B Women in Socialist Society

Philosophy 2160A/5160A Philosophical Issues in Feminism

Sociology/Anthropology 2190 Sex Roles in Cultural Perspective

Spanish 2090A Women in Latin America

Comparative Literature 210 Theories & Manifestations of Love in Mediaeval Europe

Education 4101A History of Western Educational Thought

Education 4311A Psychology of the Exceptional Child

Education 4372B Social Psychology of Education

English 207R Canadian Literature

English 209R Twentieth-Century Fiction

English 234R The Short Story

English 354R Victorian Novel

English 453R Twentieth-Century English Literature

French 2021B La Femme en France et au Canada

Political Science 2400R Justice, Law, Morality

Political Science 255B Marxist Theory

Psychology 2020A/B Psychological Aspects of Social Issues

Psychology 2080A/B Social Psychology

Psychology 3120R Issues in Clinical Psychology

Psychology 3220R Community Psychology

Religion 100R Love, Death, Religions

Religion 201R Western Religious Experience

Russian 3270B The Russian "Heroine"

Sociology 2200 Sociology of the Family

Sociology 307 Human Nature and Anthropology

Sociology 3300 Cross-Cultural Study of Socialization

Spanish 2110B Cuban Cultural Revolution

Theatre 2010R History of Theatre

Theatre 3500R The Modern Theatre

School of Dental Hygiene

Faculty of Dentistry

(Mailing Address) — Faculty of Dentistry, Dalhousie University, Halifax, N.S. B3H 3J5

Faculty 1984-85

S.M. Knox, Dip. DH (Algonquin), BS (Nipissing), MEd (Lakehead), Assistant Professor of Dental Hygiene, Director of the School of Dental Hygiene

E. Andrews, Dip. DH (Dal), BSc (Acadia), Lecturer in Dental Hygiene

G.P. Brown, Dip. DH (Dal), BA (St. Mary's), Lecturer in Dental Hygiene

G.M. Butt, Dip. DH (Dal), BA (St. Mary's), Assistant Professor of Dental Hygiene

T.E. Drake, Dip. DH (Dal), Instructor in Dental Hygiene

E.A. Forrest, Dip. DH (Dal), Instructor in Dental Hygiene

G.L. Kaiser, Dip. DH (Dal), Instructor in Dental Hygiene

G.P. Kilcup, Dip. DH (Dal), Instructor in Dental Hygiene

M.E. Kinnear, Dip. DH (Dal), Lecturer in Dental Hygiene

P.M. Larder, Dip. DH (Dal), BS in Ed. (Northeastern), MSc (Dal), Assistant Professor of Dental Hygiene

K.F. MacDonald, Dip. DH (Forsyth), BS (Boston), MEd (Dal), Associate Professor of Dental Hygiene

T.L. Mitchell, Dip. DH (Dal), BSc (Dal), Lecturer in Dental Hygiene

P.L. Mitton, Dip. DH (Dal), Lecturer in Dental Hygiene

Sheila O'Connor, Dip. DH (Springfield), Lecturer in Dental Hygiene

N.R. Prowse, Dip. DH (Dal), BA (Acadia), Lecturer in Dental Hygiene

P.K. Scott, Dip. DH (Dal), Instructor in Dental Hygiene

General Information

Dental Hygiene was first offered as a formal education program in 1913 at the Fones Clinic in Bridgeport, Connecticut. Since then the profession has grown steadily, and there are now more than two hundred dental hygiene programs in North America. In recent years, the movement has spread to other countries as well. In 1961 a diploma course in dental hygiene was established in the Faculty of Dentistry, Dalhousie University.

The dental hygienist is a university educated and legally qualified auxiliary to the dental profession. Under the direction of a dentist, the hygienist makes a significant contribution to preventive dental health service by promoting dental health through educational activities in schools, clinics, and private dental offices. The hygienist makes an important contribution to the efforts being made to improve the dental health of the people of Canada.

Many dental hygienists are employed in private dental offices. There are, however, other areas of practice such as local governments and schools, provincial and federal government departments, industry, hospitals and teaching in schools of dental hygiene.

Classes in the program in dental hygiene are offered within the Faculties of Arts and Science, Medicine and Dentistry. The School of Dental Hygiene is located on Carleton Campus at Dalhousie University.

University regulations applicable to the students of all Faculties will be found in the general section of the Calendar.

Provincial Regulations

Students are reminded that the Diploma in Dental Hygiene is not the only requirement for admission to practice in any province. The regulations for admission to practice are established by the licensing board of the province

in which the person desires to practice. Information on these requirements may be obtained from the respective Dental Registrars whose names and addresses may be obtained from the Office of the Dean.

Diploma

A two-year program leading to a Diploma in Dental Hygiene.

Entrance Requirements

A student may be admitted to the school of Dental Hygiene by fulfilling the following requirements:

Admission

The student must have completed Nova Scotia Grade XII (or its equivalent) with a minimum of 60% in five academic subjects — three of which must include English, (Applicants whose native language is French may substitute classes in French for classes in English, however, instruction at Dalhousie is in English and the applicant must be proficient in English), Chemistry and Biology. The remaining two subjects may be chosen from Mathematics, Sciences, History and Languages. One of the two subjects, however, may be chosen from additional subjects offered in high schools and not mentioned above and approved through the Faculty of Arts and Science.

Admission of Applicants Educated in U.S.A.

The minimum entrance requirement for candidates from the United States is high school graduation with exceptionally high standing (high CEEB) scores and/or advanced placement work). Normal admission to the first year of the Dental Hygiene course requires completion of one year of study (30 semester hours) at an accredited institution of higher learning in the U.S.A.; students so admitted will not be granted advance standing.

Further information can be obtained by writing to the Admissions Office at Dalhousie.

Application Procedure

Persons who have satisfied the entrance requirement may apply for admission. Applications must be made on the regular application forms, and must be submitted to the Office of the Registrar by February 1st in order to be considered for admission in the following year. Applications must be complete to be considered by the Admissions Committee. However, applications filed by the deadline can be completed any time up to June 30th and are considered when completed if unfilled places remain in entering class. Preference is given to residents of the Atlantic provinces, but applications by qualified students from other provinces or countries are considered.

A new application form must be submitted in each year in which application is made. Official transcripts in support of the academic record must be forwarded by the Institution or Institutions at which the applicant completed pre-professional studies. If the applicant is still engaged in university studies, it would be advantageous to forward an interim transcript. However, a final transcript must be forwarded on completion of these credits.

To ensure physical and mental fitness, a medical and dental certificate (which are part of the official application forms) must be completed on behalf of each applicant.

Three confidential evaluation forms are to be forwarded directly to the Registrar. At least one of the forms should be from a teacher of the faculty member in one's most recent year of study, who has taught the applicant. The remaining form(s) should be from someone (not a relative) well known in the applicant's community.

An application will not be considered if the applicant has been required to withdraw from studies at any other school of Dental Hygiene at the request of the Faculty of that institution, unless the application is supported by a recommendation of the Dean of that School. In exceptional circumstances, certain of these regulations may be waived or modified by the Faculty Admissions Committee.

Applicants may be requested to make themselves available for an interview.

Academic Year

The academic year for the first year in Dental Hygiene begins in early September and continues until the latter part of April. Classes begin immediately after the regular registration date. Late registration will be permitted only under exceptional circumstances and with the approval of the Dean.

Class Work

Students must prepare such exercises, reports, etc., as may be prescribed, and in classes involving laboratory or practical work, they must complete such work satisfactorily before any credit for that class can be given. A student will not be permitted to enter the class of any year until all subjects taken in previous years have been passed.

Examinations

In order to qualify for admission to examinations, candidates must attend the prescribed classes of the curriculum regularly and punctually. Under ordinary circumstances, candidates will not be considered qualified for admission to examinations if absences have exceeded 10% of the prescribed class hours.

Class Grades

Upon completion of a class, a student will be awarded a grade of A+, A, A-, B+, B, B-, C, D, FM, or F. In this system A+ is the highest and D is the lowest passing grade; FM is a failing grade that will allow an otherwise qualified candidate to take a supplemental evaluation; F is a failing grade disqualifying the student from further evaluation without repeating the class.

The faculty concerned is responsible for defining the requirements for grades A, B, C, D, FM and F. If faculty also wishes to award any of the grades A+, A, A-, B+, B, B-, definitions of these requirements must be available as well.

Grade Point Equivalent and Averages

Grade point equivalents will be used to calculate grade point averages, which in turn will be used to determine class standing and as factors in determining recipients of prizes and awards.

Grade	Point Equivalent
A+, A, A-	4
B+, B, B-	3
C	2
D	1
FM, F	0

Calculation of Average

Each course is assigned a weight based on its length and the mix of lecture, laboratory or clinical components. An individual student's point equivalent for each course is multiplied by the course weight. The student's grade point average is calculated by adding up the weighted grade point equivalents earned for all the separately numbered courses for the academic program year and dividing by the sum of the course weights for all classes.

Supplemental Examinations

A candidate who has received FM grades in not more than two subjects of any year and who has attained the required grade point average of 2, shall be entitled to supplemental examinations in such subjects, if qualified in attendance and class work for admission to examination. A candidate who has failed in more than two subjects in any one year or who has received an F grade in any class or has received a grade point average less than 2, shall not receive any credit for work done in that year.

Supplemental examinations are held on the day specified in the Academic Calendar, and during the regular examinations in the Spring, but at no

other times and are written at Dalhousie unless approval is obtained to do otherwise. Other forms of supplemental evaluations may be prescribed for different aspects of the program such as laboratory and clinical assignments. These are carried out in periods determined by the Faculty. Application for admission to a supplemental examination must be made on or before July 15th on the application form which may be obtained from the Dean of Dentistry's Office and must be accompanied by the proper fee. On passing a supplemental examination or evaluation the candidate will receive no higher than the lowest passing grade.

Promotion and Graduation

First-year students cannot be promoted unless they have passed all subjects and obtained a grade point average of 2.0. Students in second year cannot graduate unless they have passed all subjects, obtained a grade point average of 2.0 in all didactic subjects, and an overall grade point average of 2.0.

Instruments, Equipment, Textbooks

All instruments, equipment, and supplies are provided on loan by the University. Students will be held responsible for broken or damaged equipment and instruments. There is a \$200.00 fee for the use of instruments. Students must purchase uniforms and lab coats of a specified quality and style as well as the textbooks required for each of the classes.

Students desiring further information may write to the Director, School of Dental Hygiene, Dalhousie University. Those desiring to submit applications for admission should write directly to the Office of the Registrar, Studley Campus, Dalhousie University, Halifax, Nova Scotia B3H 3J5.

Academic Program

The following classes are required for a Diploma in Dental Hygiene:

First Year

Chemistry 105R: Study as related to the needs of dental hygiene.

Anatomy 103C: This is a one-half credit class taught by the Department of Anatomy in the Faculty of Medicine and designed especially for Dental Hygiene students. Scope and sequence are coordinated with Physiology 101C, which is taken concurrently.

Physiology 101C: This is a one-half credit class offered by the Department of Physiology and Biophysics in the Faculty of Medicine. The lectures are coordinated with Anatomy 103C, which is taken concurrently.

English: An introductory class in English. See English 100 in Faculty of Arts and Science section of this calendar.

Microbiology 100A: Study of microorganisms.

Nutrition and Biochemistry 1004B: Aspects of biochemistry relevant to nutrition are discussed in connection with each nutrient.

Correlative Craniofacial Embryology and Histology 1101R: The objective of this class is to introduce the subject of craniofacial embryology and histology and to make it clinically relevant by correlating developmental, microscopic, anatomic, and clinical aspects of the subject. Both developmental and pathologic correlates are discussed. This new class is offered jointly by the Dept. of Oral Biology, Faculty of Dentistry and the Dept. of Anatomy, Faculty of Medicine for both first year dental students and first year dental hygiene students.

Radiology 1221R: During the first year, a series of lectures is given on the technical phase of radiology, including the Bisecting and Paralleling techniques, Rectangular-field Collimation, radiation hazards and hygiene, as well

as slide demonstrations of the normal radiographic features of the human jaws. In second term, students are given practical demonstrations and instruction in the techniques of intra-oral and extra-oral radiography and panoramic radiography in a clinical setting.

Dental Biomaterials Science 1331A: Study of materials used in dentistry, lectures, demonstrations, and laboratory exercises. The class on Dental Biomaterials for the dental hygiene students is approximately 40 hours. Emphasis is placed upon instructing the students as to the reasons why specific materials are employed, and the ways in which these materials react to the oral environment.

Periodontics 1342B: This class begins in first year and is continued in second year. It is a study of diseases affecting supporting structures of the teeth.

Dental Anatomy 1501C: Structure of human teeth: reproductions of tooth forms by drawings and carvings.

Preclinical Dental Hygiene 1502R: Objectives and principles of oral hygiene, instrumentation in oral prophylaxis, laboratory and clinical practice of techniques.

Dental Hygiene Seminar 1503B

Dental Health Education 1504B: Introduction to recent oral hygiene concepts. Using simple patient simulation exercises, students are encouraged to develop dynamic approaches to patient education. Review of oral hygiene aids.

Dental Hygiene Restorative 1505R: Instruction in restorative procedures. This class includes lectures and laboratory procedures in the placing, contouring and finishing of all plastic restorations in prepared teeth.

Psychology 1401B: A special class to meet the needs of the profession, commencing in second term and continuing in second year.

Orientation to Dental Practice 2402B: A series of lectures on topics in practice management of special interest to the dental hygienist, including an introduction to principles of management, selection of personnel, job hunting skills, office systems and processes, and professionalism.

Dental Hygiene Jurisprudence 2403B: A series of lectures on topics relating to the responsibilities of both the dentist and the dental hygienist, including principles of law, dental standards, interpersonal legal relations, consent to treatment, patient records, licensure discipline, human rights legislation, malpractice insurance, employment contracts, and the hygienist as expert witness.

Dental Hygiene Ethics 2406A: A series of lectures and seminars on ethics and their application in the dental hygiene field. Topics include beneficence, respect for autonomy, informed consent, paternalism, distribution of care, prevention vs. crisis treatment, and models of health and disease.

Health Education 2501R: Program planning, instructional methods and media used in teaching oral health, including nutrition counselling related to dental disease control, smoking and oral health, and fluoridation. Extensive field experience is arranged.

Dental Hygiene Clinical Practice 2502R: Techniques of oral prophylaxis.

Seminar on Special Needs Populations 2503R: Student discussions (seminar format) on selected populations including the elderly, the medically compromised patient, and the disabled. Second semester student presentations on topics of own choice.

Dental Specialties 2504R: Idiosyncrasies of treatment within the dental specialties.

Second Year

Sociology: See Sociology 1000 and Social Anthropology in Faculty of Arts and Science section of this calendar.

Applied Nutrition for Preventive Dentistry 2002A: Changing nutritional needs throughout the life cycle with particular emphasis to their application in preventive dentistry. Also considered are some of the socio-economic and cultural determinants of food habits.

Pharmacology 2021B: Pharmacology and dosage of drugs used in dentistry.

First Aid 2003A: St. John Ambulance certificate course.

Cardiopulmonary Resuscitation 2004A: Nova Scotia Heart Foundation certificate course.

General and Oral Pathology 2111A: The study of the basic principles concerning disease in general and those affecting the hard and soft tissue structures of the oral cavity in particular. Rotation to the Mouth Clinic and clinical aspects of diseases of the mouth are included in this course.

Patient Management Seminar 2311R: A series of monthly seminars which focus on clinical patient care activities of third and fourth year dental students, as well as second-year dental hygiene students and dental assisting staff. Occasional chart audits provide a focus for assessing the management capabilities of students in each vertical group.

Dental Oncology 2312A: The study of dentistry in relation to the patient receiving cancer treatment.

Clinical Dental Hygiene Restorative 2331R: Clinical practice of techniques of restorative dentistry.

Periodontics 2332A: Continuation of the study of oral manifestation of disease affecting supporting structures of the teeth, commenced in first year.

Psychology 2401R: Continuation of the relation begun in first year of this subject area to the specific needs of the profession.

Faculty of Health Professions

The Faculty of Health Professions consists of the School of Nursing, College of Pharmacy, School of Recreation, Physical and Health Education, School of Physiotherapy, School Of Occupational Therapy, School of Human Communication Disorders and The Maritime School of Social Work. The graduate programs are described in the calendar of the Faculty of Graduate Studies.

Administrative Officers of the Faculty

Tonks, Robert S., B Pharm, PhD (Wales), FPS, FI Biol., Dean of the Faculty of Health Professions

O'Brien, Daniel W., B.Comm., MSW (SMU), Adv. Dip. SW, DSW (Penn.), Associate Dean

General Regulations

Admission and regulation procedures are, in general, the same as those for Arts and Science. Certain special requirements are described in the entries for the various schools. The following regulations apply to all programs in the faculty.

1. Counting of Classes Toward Two Undergraduate Degrees

A student who already holds an undergraduate degree from Dalhousie, or another recognized university, and who wishes to obtain an undergraduate degree from the Faculty of Health Professions, must fulfill the requirements of the second degree and meet the following stipulations:

- (a) only classes that are applicable to the course for the degree from the Faculty of Health Professions may be counted for credit;
- (b) each class carried forward must bear a grade of C (or equivalent) or better;
- (c) grade requirements of the School or College must be met in all new classes.

2.1 Grade Points, Minimum Standing, and Degree With Distinction

Within the Faculty of Health Professions, a grade point average system has been instituted. A letter grade of A +, A or A- equates to 4 grade points; B+, B, B-, 3 points; C, 2 points; D, 1 point; FM and F, no points. In addition, the Schools have a computation of grade point averages and cumulative requirements for each year. The grade point average obtained is computed by multiplying the number of grade points in each class by the credit hours for that class. The sum of these products is then divided by the total number of registered credit hours to obtain a grade point average for the year's performance.

2.2 Grade Point Average Requirements

Each School has individual requirements. Refer to the specific School or College section of the calendar for further details.

2.3 Student Progress Review

The Committee on Studies of each School or College regularly review each student's performance. A student's performance may also be reviewed by the Committee on Studies of the Faculty of Health Professions. Students whose work is unsatisfactory may be required to withdraw from their present

course of study, reduce their course load, withdraw from the class or classes concerned, or be excluded from the relevant examinations.

2.4 Failure to Meet Academic Requirements

A student has not fulfilled the requirements for a class when the minimum accepted grade set by the School or College has not been met. This minimum grade could be a D in some cases and a C or B- in others.

2.5 Degree with Distinction

(a) The candidate must fulfill the requirements for obtaining a degree as detailed in the calendar by a School or College of the Faculty of Health Professions.

(b) All credits earned at Dalhousie University toward the baccalaureate degree are included in the calculation.

(c) The candidate must have a cumulative Grade Point Average of 3.66 or better.

2.6 Dean's List

The Faculty of Health Professions recognizes students with good academic records by placing their names on the Dean's List. Full-time students* are considered annually for the Dean's List using the following criteria:

- (1) The recipient will have satisfactorily completed at Dalhousie University, the regular minimum credit hours and noncredit courses required by a School or College during the regular academic year and prior to September registration.
- (2) When Dalhousie University Summer School courses are taken, these will be included in the calculation of the grade point average for the academic year (September 1-August 31) in which they are taken.
- (3) The recipient must obtain a grade point average of 3.55 or better.

* Consult each School or College Calendar entry for full-time status.

2.7 Appeal

Students may appeal decisions pertaining to a School's interpretation of academic rules and regulations to the Faculty of Health Professions Committee on Studies. Normally, appeals to this committee occur after appeal procedures at the School/College level have been exhausted. Copies of Faculty appeal procedures may be obtained from the Directors of the Schools/College or from the Dean.

University Medal

A university medal is awarded to students completing programs in Nursing, Pharmacy, Recreation and Physical and Health Education, Physiotherapy and Occupational Therapy who meet the following requirements:

(1) The candidate must have completed a minimum three year equivalent of full-time study within a given School or College of the Faculty of Health Professions in order to be considered eligible to compete for a university medal. In addition, the student must complete two regular academic years carrying a full course load, (as detailed in the calendar by the School or College) during their final years at Dalhousie University. Calculations are based on a minimum three year equivalent of full-time study within the given School or College. All credits taken at Dalhousie University toward the baccalaureate degree are included in the calculation.

(2) The candidate must have the highest academic standing based on the total of each letter grade (A+, A, A-, etc.) awarded throughout the years of study.

(3) The candidate must have a GPA of 4.00 in the final full (course load) year.

(4) The candidate must have a cumulative GPA of 3.8 or better.

School of Nursing

School of Nursing Academic Staff 1984-85

Robert S. Tonks, B Pharm, PhD (Wales), FPS, FI Biol., *Dean of the Faculty of Health Professions*

Phyllis Noerager Stern, DNS, MS, BS (Calif.), *Professor and Director*

Associate Professors

Mona June Horrocks, BSN (UBC), MS-PsychN, MS-CHN Post Masters Degree, CMHN (UCSF)

Barbara Keddy, BScN (MSVU), MA, PhD (Dai), RN

Elizabeth Lambie, BSc (Home Ed.) (Acad.), MPH (Nutrition) (Mich.), PDT

Ruth C. MacKay, BA (McMaster), MN, MA (Emory), PhD (Kentucky), RN

Judith A. Ritchie, BN (UNB), MN (U. Pitts.), PhD (U. Pitts.), RN

Marilyn S. Riley, BN (Dal), MScN (W. Ont.), RN

Denise Sommerfeld, BScN (MSVU), MSN (UBC), RN

Miriam Stewart, BScN (McM), MN (Dal), RN

Patricia L. Sullivan, BScN (MSVU), MSN (Boston), PhD (Alta.), RN

Julia Wong, BScN (MSVU), MScN (W. Ont.), RN

Shirley Wong, BScN (MSVU), MScN (W. Ont.), RN

Assistant Professors

Margaret Arklie, BN (Dal), MS (Boston), RN

Joyce E. Carver, BN (Dal), MEd (Media) (Boston), RN

Suzanne Caty, BN (McG), MSc (U. de Montreal), RN

Barbara L. Downe-Wamboldt, BN (Dal), MEd (Dal), Dipl PH (Dal), RN

Mary lou Ellerton, BScN (Ott.), MN (McG), RN

Heather D. Fraser-Davey, BScN (MSVU), MSc (A) (McG), PhD (Dal), RN

Frances Gregor, BN (Dal), MN (Dal), RN

Jane Haliburton, EdD, MS (Boston), BN (McG)

Geraldine Hart, BN (McG), MSN (UBC), RN

Jean M. Hughes, BN (Dal), MS (Boston), RN

Ruth E. May, BA (Wellesley), CNM, RN

Donna M. Meagher, BScN (MSVU), MS (McM), RN

Lynette L. Mensah, BN (Dal), MA, DPHN (Dal), SCM (England), RN

Tania Noldé, BSc PHN (Ott.), MPH (Hawaii), SRN, SCM (England), RN

Carol L. Smillie, BScN. (UBC), MSc (Ed.) (Dal), RN

Deborah L. Tamlyn, BN (McG), MEd (Ott.), RN

Lecturers

Linda M. Berry, BN, MN (Dal), Dipl Nsg Ed (U. West Indies), SRN, SRM (England)

Elizabeth Cooper

Charlene Day

Nancy Harmon-Ferrier

Geralynn Hirsch, BN (Dal), MScN (Yale), RN

Carol MacAdam, Dipl OPN & PHN (Dal), RN

Patricia Melanson, BN (Ott.), MN (Dal), RN

Brenda M. Montgomery, BScN (MSVU), Dipl in Teaching (Dal), SRN (England), RN — Assistant Director

Rosemarie A. Pogoda, Cert. CHN (Man.), RN

Sharon Richardson

Sandra Ryan, Dipl. OPN & CHN (Dal), SCM (Australia), RN

Susan E. Youden, MN (McG), BGN (Dal), RN

Instructors — Skills Laboratory

Eloise Bethune, BScN (MSVU), RN

Barbara Bleasdale, BN (Dal), RN

Special Lecturer

Lamont E. Sweet, MD, FRCP

Honorary Appointments

Marlene Grantham, MSc (A), BScN, PHN (W.Ont.), RN

Elizabeth Lethbridge, MN (Dal), BN (McG)

Preceptors

Many nurses, health-care professionals and persons in other disciplines gave of their time and expertise to assist in the education of the nursing students in all years of all programs. These valuable preceptors are too numerous to list, but are a vital part of the program. Names can be obtained by contacting the School of Nursing.

The School of Nursing was organized in 1949. A five-year basic program in nursing leading to the degree of Bachelor of Nursing Science and also a one-year program for registered nurses leading to the diploma in Public Health Nursing or in Teaching and Supervision in Schools of Nursing were offered. In 1961 the School of Nursing became a constituent part of the newly established Faculty of Health Professions. The basic degree course of study was reorganized again in 1966 into an integrated program. In September 1968, the 3-year Bachelor of Nursing program for registered nurses was completely revised to provide depth and continuity in the professional course and a wider choice of liberal arts subjects. A two-year diploma program in Outpost Nursing designed to prepare registered nurses for positions in remote areas of northern Canada began in September 1967. At present the School offers the following undergraduate programs. Bachelor of Nursing: 4 year integrated program; Bachelor of Nursing for Registered Nurses: 3 year integrated program; Diploma in Outpost and Community Health Nursing: 15 months.

Note: The programs for the Bachelor of Nursing Degree are being revised and therefore subject to change. These changes may affect curriculum content, admission requirements, grade point average regulations and/or degree completion requirements. Prospective students should write or call the Admissions Office of the School (902-424-2535) for information prior to submitting application for admission. Students presently enrolled in the School will continue in the current program under current rules and regulations.

The curriculum for Registered Nurses entering the BN Degree program will remain the same for 1985/86, however, it is under revision for September 1986. The revised degree program for generic students may be implemented in September 1985.

Bachelor of Nursing Degree Program

The School of Nursing offers a course leading to the degree of Bachelor of Nursing, organized in three ten-month years and one (final) academic year. Graduates are eligible to write examinations for membership in the Registered Nurses' Association of Nova Scotia. The program prepares nurses who are ready to practice nursing. Many of the graduates begin to rise to positions of leadership very soon after an appropriate period of practice with the potential to become leaders in nursing.

Admission Requirements

Satisfactory completion of Nova Scotia Grade XII examination in the University Preparatory Programs or the equivalent. Evidence of this must be submitted no later than August 1st.

English, Chemistry and Mathematics at Grade XII level are required.

Applications close on March 31st and applicants are notified of their acceptance by May 20th.

Priority consideration will be given:

- first, to permanent residents of Nova Scotia, and Prince Edward Island;
- second, to permanent residents of other Canadian provinces;
- third, to all other applicants.

Grade Point Average Standards (GPA)

The grade point average system is described in the Faculty of Health Professions regulations in the calendar.

The GPA is calculated at the end of the nursing academic year (June). All credits from Dalhousie to be used as credits toward the attainment of a Nursing degree are involved in the GPA calculation.

Students must attain a GPA of 2.0 at the end of the first academic year in order to progress to second level nursing classes. Students must maintain a cumulative GPA of 2.0 in order to progress to third and fourth level nursing classes. Failure to meet the G.P.A. requirements or failure in a required course may result in the student being required to withdraw from the school.

Degree Requirements

A student must obtain a minimum cumulative GPA of 2.0 for the entire undergraduate program and accumulate a minimum of 120 credit hours.

Grades

The following clinical classes require a C grade for passing: N1100, N2100, N3100, N4100.

Curriculum

The required classes for the students enrolled in this program total to 120 credit hours. There are eleven compulsory nursing classes for a total of sixty-six credit hours: Nursing 1000, 1100, 2000, 2100, 3000, 3100, 4000, 4100, 4300, 4400, and 4500 or 4600. The general education classes total 54 credit hours. Twenty-four credit hours are compulsory classes: Biology 1000 (6); Chemistry 143 (6); Anatomy 101C (3); Physiology 101C (3); Microbiology 100A (3); and Math 1060A/B (3). The remaining thirty credit hours are elective classes normally to be taken from the Faculty of Arts and Science, Faculty of Administrative Studies, or other approved courses from the Faculty of Health Professions. At least two of these elective classes must be beyond the 100/1000 level, one of which must be a social science; they may be in separate subjects or both in the same subject. The selection of the elective classes or any change in these shall be discussed with the faculty adviser. The nursing classes are introduced in the first year and are correlated with the general education classes throughout the four-year period. Nursing classes may consist of lectures, discussions and laboratory periods, the clinical classes extend from September to June for the first three years of the program. Nursing laboratory sessions take place in hospitals and community agencies within and outside the metro area. The laboratory sessions are under the direction of faculty members. The student's total educational experience is planned and directed by the University.

The primary objective of the basic undergraduate four year degree program is to prepare nurse practitioners capable of functioning in our rapidly changing society. The student is helped to develop both technical skills and the ability to think critically and creatively. The graduate of the program is able not only to give nursing care but to modify this care and assume new functions as the nature of nursing changes. To this end, the curriculum is integrated around core concepts and basic principles. Each of the traditional nursing specialties — medical-surgical, psychiatry, maternal-child, community health — is presented throughout the four years, at progressively increasing levels of complexity. Nutrition and pharmacology (given in cooperation with the College of Pharmacy) are also intergrated with the program.

There is considerable emphasis on the interplay among the physiological, psychological and socio-cultural factors affecting the nursing process. The curriculum also stresses the team approach to the delivery of health services and the nurse's role as an effective member of the health team.

Throughout the four years, selected clinical learning experiences involve the student in caring for patients with problems related to concurrent lecture content.

In this period of four years the student is prepared for the practice of nursing as required by the Registered Nurses' Act of Nova Scotia. On completion of the fourth year the student is eligible to write the examinations conducted by the Registered Nurses' Association of Nova Scotia, which is a requirement to practice as a registered nurse in Nova Scotia.

Program Leading to Bachelor of Nursing Degree for Registered Nurses

The program is designed for Registered Nurses and consists of 15 classes arranged over a three-year period.

It is a general program, providing depth and continuity in the professional subjects and allowing for considerable freedom of choice in the general education classes. Emphasis is on the interdisciplinary approach in the provision of comprehensive health care.

A student normally must complete undergraduate studies within six years of first registration in a nursing class and within ten years of taking Arts and Science credits for the total program. The four nursing classes at 4000 level are normally taken during the final full time academic year (September to May) *unless special permission* is obtained from the post-RN Coordinator and the Committee on Studies. *If necessary* no more than two Arts and Science electives may be taken during the two summer sessions immediately following completion of the 4000-level classes (one class in each session).

Students who want to complete the program in two calendar years require special permission to take nursing 3700 concurrently with the four nursing classes at the 4000 level.

Admission Requirements

The requirements for admission to the Post RN Degree Program are as for the BN program above. In addition to these requirements, the applicant must (a) submit proof of current membership in the Nurses' Association of the country or province of residence; (b) present transcript of RN examination or equivalent; (c) have one year working experience as a registered nurse.

Grade Point Average Standards

The grade point average system is described in the Faculty of Health Professions regulations in the Calendar. A student must maintain a *cumulative* GPA of 2.00 to progress from one year of the program to the next.

Degree Requirements: A student must obtain a minimum cumulative GPA of 2.0 for the entire undergraduate program and accumulate a minimum of 90 credit hours. Students must submit proof of current Nursing registration each year they are enrolled in the nursing program.

Curriculum

The classes for students enrolled in this program consist of 9 general education classes and 6 nursing classes.

1. The general education classes include the following required classes: (1) a science class (which may be chosen from Biology, Chemistry, Mathematics, Physics, Anatomy 101C, and Physiology 101C) (2) Education 4340 and (3) Mathematics 1060A or 1060B (Statistics). The remaining 6 ½ classes are electives. These electives are to be taken from the Faculty of Arts and Science, Faculty of Administrative Studies or approved classes from the Faculty of Health Professions. Four of the electives must be beyond the 100/1000 level. Selection of one social science within the electives, and of two or three classes in one discipline, is advised.

2. The required nursing classes are as follows: N2700, N3700, N4300, N4400, N4500 or N4600, and N4700.

Sample Course of Study

Second Year: A Science, Education 4340, Nursing 2700, Arts and Science Electives

Third Year: Math 1060A or B (Statistics) (½ credit), Nursing 3700, 3-½ Arts and Science Electives (3 of which are at the 200/2000 level or above)

Fourth Year: Nursing 4300, 4400, 4500 or 4600, 4700, 1 Arts and Science Elective (at 200/2000 level or above)

All elective classes are subject to the approval of a faculty advisor. For the description of Arts and Science subjects see the Faculty of Arts and Science section of this calendar.

Grades

The following clinical classes require a C grade for passing: N2700, N3700, N4700, and N4600.

Diploma Program for Registered Nurses in Outpost and Community Health Nursing

A 15-month program in Outpost and Community Health Nursing is offered in cooperation with the University Medical School and Medical Service Branch, Health and Welfare Canada, and prepares registered nurses for positions in remote areas of northern Canada where medical care by resident doctors is not continuously available. Instruction during the program is highly individualized and clinically oriented. One academic year, extending over a period of approximately eight months, is spent at the University. This is followed by a 28-week, University-directed internship which is spent in remote areas of Canada. A diploma in Outpost and Community Health Nursing is awarded at the completion of the program. Students are admitted to the program in September and in January.

Admission Requirements

- (a) Nova Scotia Grade XII or equivalent;
- (b) Current registration in a province or territory in Canada or recognized equivalent;
- (c) At least one year of graduate nursing experience, two weeks of which must have been spent at a northern nursing station;
- (d) Admission preference is given to nurses currently employed by Medical Services Branch, Health and Welfare Canada. Other nurses are considered for admission if they agree to employment with Medical Services upon completion of the program;
- (e) Fees and a living allowance are paid by Medical Services Branch, Health and Welfare Canada, to all students. In return, all students are committed to a period of employment with Medical Services after completion of the program.

Course of Study for Outpost Nursing

First Year: to be spent at the University: Nursing 0550 A and B 0640 A, 0930 A or B, 0940 A or B, 0950 A or B, 0960 B, 4800 B. Health Education 1163A.

Internship: in remote areas of Canada: Nursing 09191 A or B, 0913 A or B, 0196 A or B.

Graduate Program

For details of the Master's in Nursing program, please consult the Faculty of Graduate Studies calendar.

Class Descriptions

All classes are 6 credit hours unless otherwise stated.

All outpost nursing classes (numbered N0550A-B through HE1163A) are open only to students enrolled in the outpost nursing program.

N1000 Nursing Science I. Introduction to the Theoretical Bases of Nursing: September-April, lecture 3 hours/week. An introduction to the theoretical bases of nursing practice, and the concepts of stress and adaptation and health, focusing on individuals who require minimal assistance in adaptation to meet their needs.

N1100 Nursing Science II. Introduction to Clinical Nursing: September-April, lab 4 hours/week; 6 weeks in May and June, 40 hours/wk. This class presents an opportunity for the students to apply theories, principles and concepts presented in N1000 and other related classes. The May-June Clinical Experience provides an opportunity for the beginning students to practice nursing in a variety of clinical settings which may take place in a setting within or outside of the metro area.

N2000 Nursing Science III. Adaptation to Short-Term Health Interruptions: September-April, lecture 4 hours/week. Prerequisites: N1000, N1100, Anatomy 101C, Physiology 101C, Basic First Aid Certificate: Biology 1000. Students develop a concept of nursing, with emphasis on the individual's and family's adaptation to stressors. Progressing from the study of health in Nursing 1000, Nursing 2000 focuses on the individual/family experiencing short term interruptions to health. Related nursing interventions designed to promote adaptation are studied. Within the context of a professional helping relationship, the nurse's role in the implementation and evaluation phases of the nursing process is emphasized. Related concepts introduced during the class include groups, teaching/learning, and planned change.

N2100 Nursing Science IV. Nursing Care of Clients with Short-Term Health Interruptions: September-April, 8-10 hours/week; May-June 5 days/week for 6 weeks. (The May-June session is under review and may be reduced from 6 weeks.) Nursing 2100 enables students to apply theories, principles and concepts presented in N2000, N1000, N1100 and required support courses. In various settings the student is provided with direct client contact, and expected to demonstrate beginning competence in helping clients (individual or family) experiencing short term interruptions to health, meet their basic needs. A scientific, problem solving approach to nursing is emphasized.

N2700 Theoretical Foundations of Nursing: lecture 2 hours, lab 2 hours/week. Clinical Practicum: Students work with patients or clients throughout the academic year and make application of theory and concepts from the class. The broad concepts of stress and adaptation are the core of this class. It focuses on a conceptual framework for nursing with reference to its relevance (1) as a theoretical foundation for professional nursing; (2) for planning patient care, and (3) for the study of nursing practice. The relationship between theory and practice is emphasized.

N3000 Nursing Science V. Adaptation to Long-Term Health Interruptions: September-April, lecture 4 hours/week. Prerequisites: N2000, N2100, Microbiology 100A, Chemistry 143, CPR Certificate. N3000 focuses on the adaptation of the individual and family in the community to a long-term health problem. Related nursing interventions designed to help the individual and family attain/maintain their optimal level of functioning are stressed. The concepts developed in N1000 and N2000 are continued and expanded. Emphasis is on the integration of knowledge for application in the nursing process.

N3100 Nursing Science VI. Nursing Care of Clients with Long-Term Health Interruptions: September-April, 13 hours/week, plus tutorial 1-1/2 hours/week; May-June, 5 day/week for 6 weeks. During the N3100 the student applies knowledge gained from N3000 by caring for individuals and families with long-term health problems. The student has the opportunity to work in the home, the hospital, and other community settings. Using a health team approach, students develop plans for helping people with whom they work, to meet their long-term health needs. Emphasis is on the identification of health teaching needs of these clients and the implementation of a plan to meet these needs. The nursing process is used as the major problem-solving method. Self-evaluation of nursing care is encouraged, and the student is assisted, as required, in selecting alternative nursing actions.

N3700 Community Health Nursing: lecture or seminar 4 hours/week, clinical practicum 2 hours/week. Prerequisite: N2700. An introductory class to examine current and future professional nursing roles that are effective in the home and the community outside the hospital. The focus is on theories and concepts that facilitate study of man's health needs across the life span with reference to global, transcultural and Canadian regional views of family and community health. Students explore and apply some of the basic concepts and tools of public health practice and how it contributes to health care delivery. Emphasis is on health care of families, how to identify their health needs and the community resources, nursing knowledge and skills required to meet them. Clinical practicum includes working directly with one or more families in the home and/or community, as individual students and with other health team workers, to deliver health care. The student's previous experience is considered in order to plan this practicum at the level of student need.

N4000 Nursing Science VII September-April: lecture 2 hours/week. Prerequisites: N3000, N3100. N4000 deals with theoretical concepts and their relationships to nursing. The main emphasis is on learning and using a comprehensive approach to health care for individuals, families and communities.

N4100 Nursing Science VII: clinical experience 8 hours/week, September-March, 12 hours/week plus 1 hour/week tutorial. March-April 40 hours/week for 5 weeks. The student applies knowledge gained in N4000. Emphasis is on working as a responsible and interdependent member of the health team. Tutorials assist students in the intergration of theory and practice.

N4300 Seminars in General Nursing lecture 2 hours/week. Students analyze current issues in nursing and in the community and consider the professional nursing role in today's society.

N4400 Introduction to Nursing Research: lecture 2 hours, lab 2 hours to be arranged. prerequisites: Mathematics 1060A. A study of the logic and thought processes basic to research, research methodology, and measurement techniques.

N4500 Nursing — A Management Process: lecture 2 hours/week. An introduction to current state of management study and practice with application to nursing. Topics include: theories and patterns of organization, organizational decision making, planning and change. The nurse's role in the health agency is studied. Team leadership, staffing, staff development and evaluation are considered.

N4600 Nursing — A Teaching Process: lecture 3 hours with Teaching Practice Period included. The components of the teaching process, and teaching strategies are introduced. These concepts are useful for the teaching in a school of nursing and for the nurse practitioner involved in inservice and patient education. A variety of curriculum development concepts are introduced, which involve setting up educational objectives, selecting and organizing learning experiences, practice teaching experiences and evaluating the effectiveness of classes and educational programs.

N4700 Analysis of Theory and Concepts in Nursing: lecture 2 hours/-week, lab 2 hours/week. Clinical Practicum: Students have the opportunity for indepth involvements with clients in a clinical area of interest to them. In the first term broad concepts are examined and analysed in relation to nursing theories as the core of the class. In the second term of the class, students have the opportunity to further test their conceptual framework through seminars and practicum related to areas of specific interests.

N4800B/Ph4950B/PT 3090B/HE2250B Interdisciplinary Course in Human Nutrition: 3 credit hours, normally spring term, E. Lambie. Prerequisite: Biology 1000 or at the discretion of the professor. The class is an interdisciplinary study of the basic principles of nutrition needs throughout the life cycle. Physiological, psychological, socio-economic, physical, educational and cultural determinants are explored to explain why the nutritional status of Canadians can vary and how this variation affects the development of chronic disease. Special emphasis is given to community nutrition in the Atlantic Region.

N4900A ISSA 2060 An Interdisciplinary Approach to Gerontology (Social Perspectives): lecture 3 credit hours, lecture 3 hours/week. This is a multidisciplinary class in Gerontology with a focus on the presentation of historical and current research studies in the field of social gerontology, primarily from a Canadian perspective. This class represents the wide range of study which is reflected in most of the sciences and humanities.

N4910B An Interdisciplinary Approach to Gerontology (Health Perspectives): lecture 3 credit hours, lecture 3 hours/week. This multidisciplinary class in Gerontology focuses on the presentation of health issues and relevant research studies in the field of aging. Various health professionals working with this age group participate, to emphasize the interdisciplinary nature of gerontology. This class is not open to students in the Basic Nursing degree.

N0550A and B Community Health Nursing and Health Education: An introductory course in which students explore and apply theories, concepts and tools of community health nursing and address the nurses' role in transcultural settings. Emphasis is on development and health care of families, the theory and practice of health education, and community development. During the second term students visit, under supervision, a family in the community and gain skills in family nursing. The nursing process is used as a tool in assisting the family and community achieve the goal of optimal functioning.

N0640A Mental Health Issues: Mental health, as influenced by cultural, environmental, and developmental factors is addressed. Communication, leadership and problem solving skills are fostered through seminar discussion. Emphasis is on transcultural community health.

N0930A or B Clinical Medicine: Common medical problems are addressed in seminars, clinical teaching and guided experience at local hospitals under the direction of University Medical School personnel and Outpost Nursing instructors. Skill in taking histories and performing physical examinations is developed. Instruction and supervised practice in basic laboratory procedures is provided by the staff of the provincial laboratory.

N0940A or B Clinical Obstetrics and Gynaecology: A program of seminars, clinical teaching, and practical experience is conducted at local hospitals under the direction of the University Medical School personnel and Outpost Nursing instructors. This class emphasizes the evaluation and care of the normal obstetrical patient and her family. Attention is given to common gynaecological problems. Supervised clinical experience is provided at the Grace Maternity Hospital. Discussion of common abnormal conditions and their recognition is included.

N0950A or B Clinical Paediatrics: Common paediatric problems are addressed in seminars, clinical teaching and guided experience at the IWK Hospital for Children under the direction of University Medical School personnel and Outpost Nursing instructors. Clinical placement in the office of a practicing paediatrician is arranged. Skill in taking histories and examining children is developed. Consideration is given to normal growth and development and the health supervision of the well child.

N0960B Clinical Surgery: This class is designed to prepare the student to care for patients with minor surgical problems and to recognize and provide emergency care for patients with more serious conditions. An introduction to commonly encountered eye problems is included. This class is directed by University Medical School personnel and Outpost Nursing instructors.

N0191A or B Field Experience in Community Health Nursing: A six week period of supervised field experience in community health nursing is arranged for outpost students during their internship. This placement is arranged at a health centre operated by Medical Services Branch, Health and Welfare Canada. It is designed to enable the student to relate and expand, in a northern setting, the community health teaching offered previously in the program.

N0193A or B Hospital Clinical Practicum: A 14-week period of supervised clinical experience at a hospital operated by Medical Services Branch, Health and Welfare Canada is arranged for outpost students during their internship. This experience is designed to review and expand the clinical teaching of the first year at a small hospital in a remote area, and thus to provide opportunity for further development of students' clinical skills and clinical judgement. Student experience is directed by the medical staff of the hospital and an Outpost Nursing instructor. Assignment to medical-surgical, obstetrical, paediatric, and ambulatory clinic patients is arranged. Students have opportunity, under supervision, to care for women during labour and to conduct normal deliveries.

N0196A or B Nursing Station Field Experience: A six-week period of supervised field experience at a northern nursing station operated by Medical Services Branch, Health and Welfare Canada is arranged for outpost students during their internship. This placement is designed to integrate teaching previously given during the program and also to provide opportunity for students to become familiar with the types of administrative and supervisory problems which a nurse encounters in this setting. Attention is given to problems relating to living and working within an unfamiliar culture and in a remote area.

HE1163A: See description in Health Education section of the calendar.

N4800 Human Nutrition — Interdisciplinary Course: See above description under this class title.

Classes Offered by Other Faculties

Classes offered by other faculties may be found in the calendar of the respective faculties. The following are of particular interest to the School of Nursing.

Chemistry 143 Introductory Chemistry and Biochemistry: lecture 3 hours, lab/tutorial 3 hours. Material in the first term is given by the Department of Chemistry and includes the fundamentals of general organic chemistry. In the second term medically relevant biochemistry is discussed by the Department of Biochemistry.

Anatomy 101C Physiology 101C: These classes are taught by the Departments of Anatomy and Physiology. They are designed exclusively for students in Health Professions and Dental Hygiene, and must be integrated in time and content.

Microbiology 100A: lecture 1 hour, lab 2 hours. This class is given by the Department of Microbiology of the Faculty of Medicine to meet the needs of the students in the Faculty of Health Professions. Elementary bacteriology and immunology includes a study of the structure and physiology of microorganisms, the ways microorganisms cause disease in man and the ways they affect man's well-being. Laboratory work provides experience in the cultivation, isolation and identification of microorganisms and demonstrates their various activities.

School of Nursing Regulations

1. All students must observe the University Regulations and those of the Faculty of Health Professions.
2. As an academic requirement, students are assessed in each year on their aptitude and fitness for the profession of Nursing. A student who, in the judgement of the faculty, fails to attain a satisfactory standard in this assessment may be required to withdraw from the School.
3. For admission to the second and subsequent years of the basic baccalaureate program, students must have passed the examinations required in all subjects of the preceding year unless, in exceptional circumstances, special permission is given by the Faculty.
4. Students in the Baccalaureate Degree Programs are responsible for (a) the purchase of uniforms including caps and shoes and a watch with a sweep hand or a digital watch with seconds display, (b) cost of accommodation and travel while on a clinical experience in areas outside the Metro area including the summer clinical. Additional expenses are incurred by the student in the Basic Baccalaureate Degree Program for field experience, books, first aid course, CPR course, graduation pin, equipment, and nurse registration examinations. Each student must also purchase name tags and crests from the University.
5. In view of the restriction on the size of classes in the School of Nursing, any applicant who has been advised of provisional acceptance must pay an additional acceptance deposit of \$100 within three weeks of such notification towards their tuition. This deposit is refundable if the applicant withdraws before July 1.
6. Adviser-Advisee Program. Each student is assigned to a faculty member from the academic advisory committee. The purpose of this committee is to help students plan their academic program, approve class selection and discuss academic progress or difficulties.
7. Students wishing to appeal a decision based on faculty regulations or decisions should follow the School Appeal Procedure. All students are given a copy of the Appeal Procedure and it is also available from the Coordinators.

School of Nursing Bursaries and Awards

For information on all prizes, bursaries, scholarships, and loans, consult the booklet "Scholarships, Prizes, and Financial Aid," issued by the Dalhousie Awards Office. For further information consult the Director of Awards, Dalhousie University.

School of Occupational Therapy

School of Occupational Therapy Academic Staff 1984-1985
 Robert S. Tonks, B.Pharm., PhD (Wales), FPS, FI Biol., *Dean of the Faculty of Health Professions*
 Barbara J. O'Shea, DipP & OT (Tor.), BSc (Queen's), MS (Colorado State),
Director and Associate Professor

Assistant Professor
 Judith S. Bloomer, BS (OT) (U. Florida), MSW (Calif. State)

Lecturers

John W. Grainger, BSc, MSc (Waterloo)
 Myra S. Kennedy, BOT (McGill), MA (Econ.) (Manchester)
 Linda A. Miller, BS (OT) (Temple), MA (N.Y.)
 Elizabeth Townsend, DipP & OT (Tor.), BSc (OT) (Tor.), M.Ad.Ed. (St FX)

Fieldwork Coordinator

Elizabeth B. Bell, DipP & OT (Tor.) BSc (Queen's), MS (Virginia Commonwealth)

Provincial Fieldwork Coordinators

New Brunswick: Carol A. Morrison, BSc (OT) (McGill)
 Newfoundland: Brenda Head, Dip OT (Alta.)
 Prince Edward Island: Margaret Anne Coles, BSR (UBC)

Regional Accredited Fieldwork Programs, 1984**New Brunswick**

Dr. Everett Chalmers Hospital, Fredericton
 Forest Hill Rehabilitation Centre, Fredericton
 Moncton City Hospital, Moncton
 Saint John Regional Hospital, Saint John
 Worker's Rehabilitation Centre, Grand Bay

Newfoundland

Children's Rehabilitation Centre, St. John's
 General Hospital, St. John's
 Grace Hospital, St. John's
 St. Clare's Mercy Hospital, St. John's

Nova Scotia

Camp Hill Hospital, Halifax
 Halifax Infirmary, Halifax
 Izaak Walton Killam Hospital for Children, Halifax
 Nova Scotia Hospital, Dartmouth
 Nova Scotia Rehabilitation Centre, Halifax
 Victoria General Hospital, Halifax

Prince Edward Island

Hillsborough Hospital, Charlottetown
 Queen's County Community Occupational Therapy Service, Charlottetown
 Queen Elizabeth Hospital, Charlottetown

The School of Occupational Therapy accepted its first class of students in September 1982. It is a regional school serving the four Atlantic Provinces. It provides the only occupational therapy educational program in the region.

What is Occupational Therapy?

Occupational therapy is a health profession concerned with restoring optimal physical and mental function in disabled individuals from all age groups, and assisting them to resume a responsible role in the family and in society. "Occupation" refers to all activities in which someone (child or adult) engages, including (but not restricted to) work-related activities. The occupational therapist evaluates function through an analysis of human activities, relationships and situations. Therapy utilizes activities which are appropriate to the person served and which have been scientifically selected to accomplish a specific functional goal. These may include personal care, play, homemaking, vocational, leisure and social activities. Occupational therapy services are best delivered in the community within the normal environment of the client, although initial treatment frequently occurs within a hospital or rehabilitation setting. The disabled person is taught to set realistic goals and to acquire, through directed experiential learning and problem-solving, adaptive skills which enable resumption of a productive and satisfying role in society.

Career Opportunities

Occupational therapy practice is broad in scope and offers a wide range of career opportunities for both men and women. As it is directed towards preventing or reducing the effects of dysfunction arising from any cause in any age group, job opportunities exist for occupational therapists in acute and chronic care hospitals, mental retardation facilities, mental health centres, rehabilitation centres, nursing homes and community service agencies. Career opportunities for occupational therapists in schools, government, industry and correctional services are increasing. Occupational therapists may find careers in administration, education, research or consulting. Normally, graduate education would be required for careers in education and research.

Licence to Practice Occupational Therapy

In some provinces, occupational therapists require a licence to practice. The School of Occupational Therapy has no jurisdiction in matters relating to licencing. These functions are entirely under the control of the provincial licencing body as distinct from the professional organization. In the Atlantic region, a licence to practice occupational therapy is required in Nova Scotia, New Brunswick, and Prince Edward Island but not in Newfoundland. Information may be obtained on provincial licencing regulations from: the Nova Scotia Association of Occupational Therapists, PO Box 3381 Halifax South, Halifax, Nova Scotia, B3J 3J1; the New Brunswick Association of Occupational Therapists, c/o Occupational Therapy Dept., Dr. Everett Chalmers Hospital, Priestman St., Fredericton, New Brunswick, E3B 5N5, or the Prince Edward Island Association of Occupational Therapists, PO Box 2227, Charlottetown, P.E.I., C1A 3N3.

Professional Associations

The Canadian Association of Occupational Therapists represents the professional interests of occupational therapists across Canada at the national level. Membership is encouraged for students and graduates. Information on membership may be obtained from the School or by writing directly to: the Canadian Association of Occupational Therapists, 801 Eglinton Ave. W., Suite 401, Toronto, Ontario, M5N 1E3.

Provincial professional organizations represent the interests of occupational therapists within a province. Further information may be obtained by writing directly to the organization. In the Atlantic region, these are: the Nova Scotia Society of Occupational Therapists, PO Box 3381 Halifax South, Halifax, Nova Scotia, B3J 3J1; the New Brunswick Society of Occupational Therapists, c/o Occupational Therapy Dept., Dr. Everett Chalmers Hospital, Priestman St., Fredericton, New Brunswick, E3B 5N5; the Prince Edward Island Occupational Therapy Society, PO Box 2777, Charlottetown, Prince Edward Island, C1A 3N5; the Newfoundland & Labrador Association of Occupational Therapists, PO Box 5423, St. John's, Newfoundland, A1C 5W2.

Program Objectives

The objective of the program is to prepare occupational therapists who are competent, responsible practitioners in the health care system. Theoretical knowledge acquired in the academic setting is integrated and applied during fieldwork experience in supervised learning situations throughout the Atlantic region and in other parts of Canada.

Skills of task and situation analysis, problem solving, client teaching strategies and scientific analysis are emphasized to enable graduates to maintain competence and professional relevance within a changing society and a changing health care system. The program in occupational therapy, an honours program leading to a degree of Bachelor of Science in Occupational Therapy, embraces the educational standards of the Canadian Association of Occupational Therapists (CAOT). At the present time, graduation from an occupational therapy program which meets CAOT standards permits membership in professional associations and satisfies the basic professional requirements for licensure in provinces where practice is

governed by statute. In October 1985 a Certification Examination will be implemented by CAOT. All graduates of accredited occupational therapy programs will be required to pass this examination to satisfy requirements of licensure and establish eligibility for membership in professional associations.

Program

The degree of Bachelor of Science in Occupational Therapy requires a minimum of four years of University study. The program of study requires at least one year of general science followed by three years of occupational therapy. Applicants must successfully complete the prescribed first year course of study in the Faculty of Arts and Science at Dalhousie University or the equivalent at another recognized university before they can be considered for admission to the School of Occupational Therapy. These requirements must be completed by May in the year of expected admission to the School of Occupational Therapy.

Fieldwork

Fieldwork is the practical component of the educational program in which students have direct contact with patients or clients outside the academic setting. It enables the student to apply theory to practice, to consolidate and integrate knowledge, and develop interpersonal and professional skills.

All Fieldwork is completed in full-time blocks which are integrated with the academic program. Adoption of the block design for the program permits full use of clinical facilities throughout the Atlantic region and allows students the opportunity of gaining experience in other parts of Canada as well. The second year of the program has a normal academic schedule followed by four weeks of fieldwork. In each of the third and fourth years, a 7-week block of full-time clinical practice is included within the second academic term. During the 1275 fieldwork hours, each student must gain experience in treatment of physical and psychosocial dysfunction and with children, adults and geriatric clients. Students may be assigned to fieldwork placements in occupational therapy programs in any of the four Atlantic provinces. Each student must complete at least one regional placement outside the Halifax/Dartmouth area and one 8-week placement outside the Atlantic region for which there is a \$25.00 placement fee. Students are responsible for the placement fee and for travel and living costs associated with fieldwork.

Fieldwork hours are completed in the following pattern, calculated on the basis of a 37.5 hour week:

4 weeks following Year 2: (OT 2221) 150.0 hours

7 weeks during Year 3: (as part of OT 3320R) 262.5 hours

8 weeks following Year 3: (OT 3321) 300.0 hours

8 weeks following Year 3 or Year 4: (OT 4420) 300.0 hours

7 weeks during Year 4: (as part of OT 4421R) 262.5 hours

TOTAL: 34 weeks; 1,275.0 hours

Application for Admission

Students considering occupational therapy should consult with the School of Occupational Therapy as soon as possible, preferably before their first registration in Arts and Science. In the Faculty of Arts and Science at Dalhousie University the required first-year classes are: Psychology 1000 or 1010, Sociology 1200, one elective (writing class), two classes from: Biology 1000 or 2000 level, Chemistry 110, 111, 112, or 120, Physics 1000, 1100 or 1300. Students who complete the equivalent prescribed first-year classes at any recognized university will be given equal consideration for transfer into the School of Occupational Therapy. Since enrolment in the program is limited, applicants should note that admission is on a competitive basis. Selection is based on academic achievement and personal suitability for

occupational therapy. Selection procedures may require an interview and personal evaluation. Preference is given to residents of the Atlantic Provinces.

Application for admission to the School of Occupational Therapy for the final three years of study is completed through the Registrar's Office using the appropriate forms. An application fee is required of all applicants. Applications must be submitted prior to the closing date published in the Almanac at the front of this calendar but admissions decisions are not made until after this date.

A completed application for the School of Occupational Therapy consists of:

1. the completed application form
2. the application fee
3. an official transcript for high school matriculation studies including standing in Nova Scotia Grade XII level mathematics or the equivalent.
4. official transcripts for the prescribed first year Arts and Science classes including interim marks for classes currently in progress. (On completion of those studies, applicants must arrange for a final official transcript to be forwarded to the Admissions Office.)
5. an autobiographical letter as described in the application information available from the Registrar's Office.
6. one confidential assessment by a class professor (as described in the application materials) sent by the professor to the Admissions Office.

Regulations

All students are required to observe the University and Faculty of Health Professions regulations as described in this calendar.

School of Occupational Therapy Regulations

1. Workload

Students must have their program approved by their faculty advisor in the School of Occupational Therapy before registration each year. In seeking this approval, students should have determined their eligibility for the proposed classes by satisfying the prerequisites prescribed. The elective classes must be at the 2000 level or higher. Except in special circumstances, a student's workload must not exceed the normal workload described in Course of Study below. A full course load is 37, 34, and 34 credit hours respectively in years II, III, and IV.

2. Grade Requirements for Professional Classes

A student must obtain a grade of at least C in each professional class for that class to be counted as a credit for the degree or as a prerequisite for another professional class. A student who earns a grade of less than C in a professional class but is otherwise still eligible to continue in the School of Occupational Therapy must repeat that class to obtain a grade of C. Professional classes are all classes with Occupational Therapy numbers.

3. Requirements of Fieldwork Classes

Fieldwork is graded on a Pass/Fail system. A student must obtain a passing grade in each fieldwork and clinical class in order to be eligible to proceed in the program.

4. Grade Point Average Requirements

In each year of study in the School of Occupational Therapy, a student must obtain a minimum grade point average of 2.00 and maintain a cumulative grade point average of 2.00 or higher.

5. Requirements for Promotion

Promotion each year is dependent upon satisfactory completion of fieldwork and achievement of academic requirements. The fieldwork

requirement for promotion is satisfactory completion of OT 2221 and OT 3321 for promotion to third year and fourth year respectively. Academic requirements for promotion each year are: (a) a cumulative GPA of 2.00 or higher, (b) a passing grade in all required classes.

6. Degree Requirements

To satisfy requirements for the Degree of Bachelor of Science in Occupational Therapy, a student must:

- a) accumulate at least 135 credit hours (or the equivalent for a transfer student) including all prescribed classes, with a cumulative GPA of at least 2.00, and
- b) satisfactorily complete 750 hours of fieldwork experience, additional to credit classes (OT 2221: 150 hours, OT 3321: 300 hours, OT 4420: 300 hours).

Note: Credit hours are accumulated only when a passing grade, including a passing grade obtained on supplemental examination, has been achieved for a credit class.

7. Degree with Honours Requirements

Residency requirements: Candidates must have completed the equivalent of three years of full time study in the School of Occupational Therapy. In addition, the candidate must have completed two regular academic years carrying a full course load, as prescribed in the course of study.

Academic and fieldwork requirements: All classes taken while registered in the School of Occupational Therapy will be included in the GPA calculation to determine honours standing. Honours standing is achieved by students who satisfy degree requirements with a cumulative GPA of 3.35 or higher, have no grade in an advanced class (2000 level and above) less than B and achieve a grade of A in OT 4421R.

8. Degree with First Class Honours Requirements

Candidates must satisfy the residency requirements stated above. First class honours standing is achieved by students who satisfy degree requirements with a GPA of 3.75 or higher, have no grade in an advanced class (2000 level and above) less than B and achieve a grade of A in OT 4421R.

9. Required Withdrawal From the Program

A student normally must withdraw from the program if at the end of the academic year in April:

- (a) less than 28 credit hours have been accumulated in that year for full time students or less than the number of credit hours in which the student was registered have been accumulated for part-time students or
- (b) having accumulated sufficient credit hours the required cumulative GPA is not attained.

A student who fails a repeated class (academic or fieldwork) normally must withdraw from the program.

10. Appeals

A student wishing to appeal a decision based on School regulations, should in the first instance attempt to resolve the issue with the instructor(s) concerned in academic classes or with the fieldwork coordinator and preceptor in fieldwork classes before proceeding as per General Undergraduate Regulation 11.

11. Supplemental Examinations

A student may be permitted to write a supplemental examination in a class for which no less than 40% of the grade was determined by a compulsory final examination. The supplemental examination constitutes the same proportion of the final grade as did the final examination during the regular session. A supplemental examination is permitted only where a student:

- (a) completed the class with a final grade of FM, and
- (b) attained the required cumulative GPA at the end of the academic year.

Only one (one full credit or 2 part credit), supplemental examination is permitted in one year, and no more than three (full credit or equivalent) supplemental examinations are permitted during a student's degree program. On successful completion of a supplemental examination a grade of C is entered on the student's record along with the notation that the grade was earned by supplemental examination. In the case of failure an F is entered. The final grade recorded is used in computing grade point averages. However, the original grade remains on the transcript.

Supplemental examinations in A classes must be written in February, and in all other classes in August, immediately following the failure. Students should consult Undergraduate Regulation 19.9 for additional regulations regarding supplemental examinations.

12. Application for Readmission

Students who have been required to withdraw from the School of Occupational Therapy may apply for readmission after being out of the School for a minimum of one year. Since enrolment in the program is strictly limited, students seeking readmission must convince the Admissions Committee that they merit a place of study in the School.

13. Voluntary Withdrawal

A student withdrawing from the University or intending to discontinue any class must have the approval of the Director of the School of Occupational Therapy and must also notify the Registrar. Students wishing to be readmitted to the program after having withdrawn voluntarily must apply for readmission through the Registrar's Office. Due to limited enrolment of the program, readmission cannot be guaranteed.

Course of Study

The prescribed first-year classes are listed in the section describing admission requirements.

Second Year: Anatomy 217R, Anatomy 210B, Physiology 203R, Mathematics 1060A, Occupational Therapy 2200B, 2201B, 2207A, 2208A, 2210C, 2212B, 2215B, 2220C and 2221B.

Third Year: Physiology 311B, Occupational Therapy 3300R, 3301A, 3305A, 3306A, 3307C, 3308C, 3310A, 3320R, 3321B, and one 3 credit hour elective in a social science.

Fourth Year: Occupational Therapy 4420A/B, 4400A, 4405R, 4406A, 4407A, 4408A 4421R, 6 credit hours of electives in Occupational Therapy, 6 credit hours of electives chosen from Arts and Science, Administrative Studies, Health Professions, or Medicine.

All classes are completed during the normal academic year with the exception of Occupational Therapy 2221B, 3321B, and 4420A/B which are completed during the summer months (see class descriptions).

Class Descriptions

Required Classes

Anatomy 217R Gross Anatomy: 6 credit hours. The gross structure of the human body is presented by anatomical regions through lectures, dissec-

tion, and laboratory study. The class, only open to occupational therapy students, includes practical sessions in surface and functional anatomy as well as lecture/demonstrations in radiological anatomy.

Anatomy 210B Neuroanatomy: 3 credit hours. Corequisite: Anatomy 217R. This class provides the student with an introduction to the organization and integration of the human nervous system.

Mathematics 1060A Introductory Statistics for Non-Mathematicians: 3 credit hours. For class description, please refer to the Mathematics section of this calendar.

Physiology 203R Human Physiology: 6 credit hours. Prerequisites: Two classes from; Biology, Physics, Chemistry. Corequisites Anatomy 217R. The function of organs and body systems is presented through lectures and laboratory work. Special emphasis is on the integration of function in the whole organism.

OT 2200B Pathology: 1 credit hour. Corequisites: Anatomy 217R, Physiology 203R. An introduction to pathological processes of disease and injury is presented including reference to immunology, the inflammatory reaction, healing and repair, thrombosis and embolism, and neoplasms.

OT 2201B Introduction to Psychiatry: 3 credit hours. Prerequisites: Psychology 1000 or 1010, OT 2207A. Students learn to recognize normal and pathological human responses to stress from physical or emotional causes and to identify behavioural manifestations of psychopathology. Theories of mental illness and the etiology, epidemiology and cause of major psychiatric conditions are presented followed by discussions of procedures used to diagnose mental dysfunction.

OT 2207A Normal Growth and Development: 3 credit hours. Prerequisites: Psychology 1000 or 1010, Sociology 1200. Theories and processes of physical, psychological and social development throughout the life cycle are presented. Roles and developmental life tasks are analyzed and high risk stages of development are discussed with particular reference to facilitation of adaptive function and prevention of dysfunction. Cultural and social factors which influence one's reaction to physical and emotional disability, chronic illness, old age and death are considered along with their relevance to occupational therapy.

OT 2208A Occupational Therapy: Theory and Process: 3 credit hours. Prerequisites: Sociology 1200, Psychology 1000 or 1010. The theoretical base of occupational therapy practice is addressed within the Mosey model of occupational therapy. Students gain an appreciation of the relationship between theory and practice through case problem solving and experiential activities using a human occupation generic frame of reference.

OT 2210C Kinesiology: 2 credit hours. Corequisite: Anatomy 217R. The scientific approach to the analysis of human movement is introduced. Mechanical principles governing human motion and functional anatomy are discussed and inter-related to develop an understanding of the factors responsible for normal movement. Techniques of analysis of the physical components of activities using observation skills and motion analysis technology are also presented.

OT 2212B Activity — Analysis, Therapeutic Selection and Adaptation: 2 credit hours. Prerequisite: OT 2208A. Corequisites: OT 2210C, Anatomy 217R. The medium of occupational therapy intervention is activity, defined in its broadest concept. The role of activity in accomplishing life tasks, satisfying physical and emotional needs and restoring physical and mental health is explored. Through independent learning modules and directed laboratory experience, students analyze a range of activities including self-care, home management, community living skills, occupational skills (play, work, study) creative/self-expressive activities and leisure time activities. Analysis of the

physical, cognitive, perceptual and psychosocial demands of an activity are related to the therapeutic use and adaptation of activity to meet defined goals.

OT 2215B Functional Measurement and Evaluation: 3 credit hours. Prerequisites: Math 106A, Psychology 1000 or 1010, OT 2208A. Corequisite: OT 2210C. Scientific principles of measurement and evaluation are discussed in relation to human physical and emotional function. Concepts of reliability, validity, standardization and norms are presented. Principles of test design including definition of objectives, pretest and revision, test administration, and organization of data for analysis are discussed in relation to evaluation measures in current use and as a basis for test development. Practical experience is provided in administering and interpreting basic evaluation measures used in the practice of occupational therapy. Interpretation of test results to identify areas of dysfunction and define functional problems is emphasized.

OT 2220C Introduction to Clinical Practice: 2 credit hours. Corequisites: OT 2207A, OT 2208A. The professional skills and ethics fundamental to the practice of occupational therapy are introduced by means of seminar and practical experience involving video recording and playback discussions. Both dyadic and group therapeutic interaction are examined with emphasis on dyadic interaction using communication skills in a variety of professional relationships. Other clinical practice skills such as role negotiation, interviewing, application of the occupational therapy clinical process in the clinical situations and professional behaviour are also taught. Brief field experiences in clinical occupational therapy programs augment didactic and experiential classroom instruction. These skills are applied during Fieldwork: Level 1.

OT 2221B Fieldwork — Level I: 0 credit hours. Corequisites: All other prescribed second year classes except Math 106A. Four weeks in the summer following second year are spent in a clinical occupational therapy program. This supervised learning experience provides opportunities for observing treatment programs and the skills of an occupational therapist. Students practise clinical skills with clients and carry out treatment procedures under the close supervision of a practising therapist.

Physiology 311B Neurophysiology: 3 credit hours. Prerequisites: Physiology 203R, Anatomy 210B. The student is provided with the principles of neurophysiology. Current concepts of the organization and function of the mammalian nervous system are surveyed.

OT 3300R Medical and Surgical Conditions: 6 credit hours. Prerequisites: Anatomy 217R, 210B, Physiology 203R, OT 2200A, OT 2210C. Corequisite: Physiology 311B. Physicians and surgeons present the etiology, pathophysiology and medical management of medical and surgical conditions frequently encountered in practice by occupational therapists. Musculoskeletal, neurological, rheumatic, respiratory, cardiac and general medical conditions are covered. Specific management strategies relevant to different age groups are presented. Rehabilitation management of residual dysfunction is discussed in relation to the team role of the occupational therapist.

OT 3301A Psychiatric Treatment Theories and Approaches: 2 credit hours. Prerequisites: OT 2201B, OT 2207A, OT 2208A. Current treatment theories and management approaches used in psychiatry are presented by psychiatrists. Discussion of the treatment environment compares institutional and community programs and individual and group treatment approaches. Theories and approaches are applied to clients of all age levels.

OT 3305A Therapeutic Procedures - Biomechanical: 2 credit hours. Prerequisites: Anatomy 217R, Physiology 203R. OT 2200A, OT 2207A, OT 2208A, OT 2210C, OT 2212B, OT 2215B, OT 2220C. Corequisite: OT 3300R. The principles and techniques of biomechanical analysis are app-

lied to the development of joint protection programs and programs to increase joint mobility, muscle strength and endurance in conditions which result in musculoskeletal dysfunction. Mechanical principles are applied to the adaptation of equipment and procedures to achieve maximum restoration of function. Graduated work conditioning programs are discussed. Bio-feedback is presented as an adjunct to therapeutic programs.

OT 3306A Therapeutic Procedures — Rehabilitative: 2 credit hours. Prerequisites: Anatomy 217R, Physiology 203R, OT 2200A, OT 2201B, OT 2207A, OT 2208A, OT 2210C, OT 2212B, OT 2215B, OT 2220C. Corequisites: OT 3300R, OT 3301A. The theory and principles of rehabilitation are presented and applied to the management of temporary and permanent disability. Evaluation tools used include functional assessment, vocational and pre-vocational testing and environmental accessibility evaluation. The principle of adaptation applied to performance, equipment, and environment is integrated with the problem-solving approach in planning programs to achieve maximum function at home, at work, at school, and in the community.

OT 3307C Therapeutic Procedures — Psychosocial: 4 credit hours. Prerequisites: OT 2201B, OT 2207A, OT 2208A, OT 2220C, OT 2212B, OT 2215B. Corequisite: OT 3301A. The Theoretical basis and current therapeutic procedures for occupational therapy in mental health programs are presented. Selected theoretical frames of references are discussed and therapeutic strategies are analyzed and applied to mental health problems. Detailed study of specific evaluation tools, including use of projective media, leads to practise in problem identification and program planning to restore optimum psychosocial function at home, at work, at school, and in the community for clients at various stages in the life cycle.

OT 3308C Therapeutic Procedures — Neurodevelopmental: 3 credit hours. Prerequisites: Anatomy 217R, 210B, Physiology 203R, OT 2200A, OT 2207A, OT 2208A, OT 2220C, OT 2212B, OT 2215B. Corequisites: Physiology 311B, OT 3300R. Current theories of the neurodevelopmental approach to the remediation of dysfunction resulting from neurological damage are presented. Theoretical constructs are applied to the development of occupational therapy programs for clients with congenital, neonatal and acquired neurological defects. Evaluation tools and treatment strategies appropriate for neurological dysfunction are presented and practised. Among the current theorists discussed are Ayres, Bobath, Brunnstrom and Rood.

OT 3310A Rehabilitation Technology: 3 credit hours. Prerequisites: Anatomy 217R, Physiology 203R, OT 2208A, OT 2220C, OT 2210C, OT 2212B, OT 2215B. Corequisites: OT 3300R, OT 3305A, OT 3306A. This class addresses primarily three areas of rehabilitation technology namely orthotics, prosthetics and technical aids to rehabilitation. The principles and current theories of orthotic and prosthetic management of upper and lower limb problems are presented along with laboratory experience in design and construction of static and dynamic orthoses. The use of external power in upper limb prosthetics and orthotics is reviewed. Strategies for training clients to use conventional and externally powered orthoses and prostheses are discussed. Technical aids to rehabilitation range from simple devices to electronic environmental controls and communication aids. Emphasis is on problem analysis and design of simple devices and evaluation and selection of electronic aids to solve rehabilitation problems.

OT 3320R Clinical Practice: 6 credit hours. Prerequisites: All second year classes. Corequisites: All third year classes except OT 3321B. Dyadic and group therapeutic interaction are analyzed in depth with emphasis on group interaction including family dynamics. Video recording and play back discussion are used to gain further understanding and skill in leadership, use of therapeutic milieu, and communication in complex clinical situations involving such issues as professional ethics, legal issues, peer review, public relations, time management and quality of care. A seven week supervised field

experience in an accredited occupational therapy setting in the Atlantic Region is included in the second term. In this experience students continue to develop clinical practice skills including problem identification and begin to develop skills in program planning under the supervision of practicing therapists serving as clinical preceptors.

OT 3321B Fieldwork — Level II: 0 credit hours. Corequisites: All third year classes except elective. Eight weeks in the summer following third year are spent in a clinical occupational therapy program. Experience is obtained in applying therapeutic principles to clinical problems. Skills in evaluation and problem identification, treatment program planning and use of therapeutic procedures are developed under the direction of the supervising therapist. With supervision, students are expected to assume partial responsibility for a small caseload during this fieldwork experience.

OT 4420A/B Fieldwork — Level III: 0 credit hours. Prerequisite: OT 3321B. Eight weeks are spent in practice under professional direction. Students develop competence in applying theoretical knowledge and clinical skills to identification and definition of client problems, planning and conducting treatment programs and measuring goal attainment. Under supervision, students assume responsibility for a caseload of approximately 75% of that of an entry level therapist. Opportunities for involvement in community health care programs are included. This class would normally be completed in the summer preceding the fourth year.

OT 4400A Pharmacology. 1 credit hour. Prerequisites: Physiology 311B, OT 3300R, OT 3301A. This class covers the effects, side effects, indications and contraindications of major classes of drugs used in selected medical and psychiatric conditions. The issue of compliance is discussed.

OT 4405R Therapeutic Program Design: 6 credit hours. Prerequisites: All third year classes. Therapeutic programs are designed within the framework of current theoretical models of occupational therapy practice. Case study methods are used to apply program design principles to program planning for clients at varying stages within the life cycle and with problems arising from biological or psychosocial causes. Development of evaluation methods to provide measures of progress and goal attainment is discussed. Topics of needs analysis and cost benefit analysis of programs are included.

OT 4406A Community Occupational Therapy: 3 credit hours. Prerequisites: All third year classes. The roles and functions of occupational therapists in schools, industry, community health care programs and social services agencies are explored. Consultant, program director, and direct service provider are community practice roles explored in relation to providing occupational therapy programs for populations at risk as well as for those with identified dysfunction. Strategies of effective communication with government and social service agencies are addressed.

OT 4407A Scientific Inquiry in Occupational Therapy: 3 credit hours. Prerequisites: Math 1060A, OT 3321B. Basic research methodology and its application to occupational therapy practice are discussed. Emphasis is on treatment evaluation and clinical investigations based on scientific principles. Students learn to design clinical recording methods to facilitate analysis of treatment effects. Critical analysis and interpretation of research literature is included.

OT 4408A Supervision and Management: 3 credit hours. Prerequisites: OT 3321B. Supervision skills are taught in relation to supervision of auxiliary staff, students and volunteers. The organization and administration of occupational therapy services in institutions and community-based agencies are discussed. Management principles related to personnel, budgeting, record keeping, reporting and program development are presented. Accountability systems such as peer review and chart audit are studied and applied to occupational therapy services. Current federal, provincial and regional

health care policies are reviewed to determine their effects on occupational therapy service development. Experience in planning student programs and inservice or continuing education programs is included.

OT 4421R Independent Study and Advanced Clinical Practice: 6 credit hours. Prerequisites: Math 1060A, all third year classes. Corequisites: OT 4405R, OT 4406C, OT 4407A. Students complete a scientific study of an approved topic under the direction of an assigned tutor. Topics must be relevant to current occupational therapy practice. Seven weeks of fieldwork experience relevant to the topic of study are used to increase knowledge and experience in the area and allow collection of data pertinent to the study. A seminar presentation and typewritten report or journal article are required.

Electives

OT 4410B Dyadic and Group Interaction: 3 credit hours. Prerequisites: OT 3321B or permission of the instructor. Dyadic interaction and group structure are analyzed in depth. Techniques applicable in occupational therapy psychotherapeutic intervention are discussed. Experience in applying dyadic and group techniques in treatment is gained through laboratory practice and clinical tutoring.

OT 4411B Behaviour Therapy: 3 credit hours. Prerequisite: OT 3321B or permission of instructor. Students learn the principles of behaviour therapy and its application in achieving behaviour change. Operant conditioning, modelling, desensitization, aversion therapy, assertiveness training, and the token economy are some of the topics discussed.

OT 4412B Advanced Neurodevelopmental and Sensory Integration Therapy: 3 credit hours. Prerequisites: Anatomy 210B, Physiology 311B, OT 3308C and OT 3321B. An in-depth analysis of advanced theories and techniques of neurodevelopmental and sensory integration therapy. Experience in applying these therapeutic procedures to clinical problems is gained in laboratory sessions and through individual clinical tutoring.

OT 4413B Independent Living Programs: 3 credit hours. Prerequisites: OT 3306C, OT 3321B or permission of instructor. Alternative needs of independent living for severely disabled persons are presented. The role of the occupational therapist in independent living programs is discussed in terms of preparing clients for independence, and program organization and coordination.

OT 4414B Theory Application in Occupational Therapy Practice: 3 credit hours. Prerequisites: OT 3321B or permission of instructor. The transition from theory to practice is explored within the context of current occupational therapy theories reported in the literature. Program models based on recent theories are developed.

OT 4415B Stress Management Through Activity: 3 credit hours. Prerequisites: OT 3301A, OT 3307C, OT 3321B. Current theories of stress as an etiological factor in disease and dysfunction are presented. The concept of stress reduction through lifestyle management is discussed within the context of occupational therapy theory. Strategies of goal setting, problem solving, and adaptation are applied through active participation in purposeful activity to reduce effects of physical and psychosocial stress and improve clients' function in social and vocational roles.

OT 4416B Vocational Rehabilitation: 3 credit hours. Prerequisites: OT 3305A, OT 3306A, OT 3321B. The role of the occupational therapist in vocational rehabilitation is explored. Job analyses, pre-vocational skills exploration and evaluation, job sample design and evaluation, situational assessment and work adjustment programs are major topics. Work related aptitude testing and career counselling methods are discussed in relation to individuals experiencing physical, cognitive and emotional dysfunctions. The

use of work information indexes and relevant community resources is emphasized.

OT 4425A/4426B/4427C Directed Study in Occupational Therapy: 3 credit hours. Prerequisite: Permission of Committee on Studies. In this course students may individually or in small groups explore a particular topic within occupational therapy under the direction of a faculty member. The topic and requirements for the class are jointly decided by the students and the professor involved. An outline of the objectives and evaluation methods for the class must be approved by the Committee on Studies before class work begins. A paper or presentation prepared for this class may not be submitted for credit in any other class.

OT 4417A/4418B/N 4900A/4901B/PH,HE,REC 4498A/4499B 4499R/PH 4960A/4970B/PT 4300A/4901B Interdisciplinary Approach to Gerontology: See N 4900A and N 4901B for description.

College of Pharmacy

Academic Staff, 1984-85

Robert S. Tonks, B.Pharm., PhD (Wales), FPS, F. Biot., *Dean of the Faculty of Health Professions and Professor*

David K. Yung, BA, BSP, MSc (Sask.), PhD (Alta.), *Director and Professor*

Professors

R. Frank Chandler, BSc Pharm. MSc (Alta.), PhD (Syd.)

F. Gordon Duff, BSP, MSc (Sask.), PhD (Fla.)

Kenneth M. James, BSP, MSc (Sask.), PhD (Alta.)

Michael Mezei, Dipl. Pharm. (Bud.), PhD (Oregon State)

Associate Professors

Patrick S. Farmer, BSP, MSc (Sask.), PhD (Portsmouth)

Mary E. MacCara, BSc (Pharm.) (Dal), Pharm.D. (Minn.)

William A. Parker BSc (Pharm.), Pharm.D. (Minn.), MBA (Dal)

Ingrida S. Sketris, BSc (Pharm.) (Tor.), Pharm. D. (Minn.)

Richard M. Sparkman, BSIE (Northwestern) MBA (William and Mary), PhD (Houston)

Assistant Professors

Issac Abraham, BPharm, MPharm (UST Ksi.), PhD (Neb.)

Harvey Freedman, BS (Pharm) (Mont.), MSc (Tor.), PhD (SNY Buf.)

Lecturers

Richard A. Merrett, BSc (Pharm.) (Tor.), MSc (Tor.)

Beth Smith, BSc (Pharm.) (Dal) PhC

Jeffrey Taylor, BSP (Sask.)

Special Lecturers

Vincent Heighton, Pharm. Dip. BSc (Dal) PhC

John J. Ryan, Pharm. Dip. (Dal) PhC

Bonnie Salsman, BSc (Pharm.) (Dal)

Roy Steeves, BSc (Pharm.) (Dal) Pharm. D. (Florida)

C. Brian Tuttle, BSc (Pharm.) (Dal), MSc (Tor.)

Preceptors (1984)

The pharmacist preceptors listed below gave their time and expertise to a structured practical training program. The program is administered by the College with the support of the Pharmacy Licencing Bodies in the Maritimes. It requires the third year students to demonstrate their knowledge and professional competency in actual practice situations in community and hospital pharmacy.

Community Pharmacists**Nova Scotia**

Sandra Aylward
Cheryl Boudreau
Anne Brennon
John Burgess
Kevin Cherry
Hawley Crosby
Mandy Crozier
James Cruickshank
Lynn Fahey
George Fairn
Anne Farrell
Dominic Gniewek
Rosemary Hayter
Arthur Hodder
Catherine Kelly
Lynn Kyte
Bernard Landry
Eileen Leahey
Thomas Lycett
Ann MacDiarmid
Elizabeth MacDonald-Creelman
Robert MacDonald
Patricia MacDougall
Darlene MacInnis
Kevin MacKay
Alex MacKinnon
Fred Martin
Robert McKean
Daniel McKeough
Donald Morrison
Mary Muise
Donald Rogers
Byron Sarson
Arnie Sommerfeld
Douglas Stallard
Gary Stone
Susan Wedlake

New Brunswick

Vincent Basque
Beverly Bell
Douglas Chapman
R.H. Gorham
Malcolm Hurre
Barbara Kierstead
Patricia LeBlanc
Anne Leslie
Eleanor Murray
Michel Robichaud
David Scott
David Skidd
Harry Smith
Doug Winsor

P.E.I.

David Campbell
Ken Ramsay

Hospital Pharmacists**Nova Scotia**

Carol Balcom
David Butts
George Crosman
Janet Cooper
Janice Dillman
Alexa Donald
Dawn Fage
Susan Ferguson
A.M. Fraser
Patricia Galbraith
Karen Gallivan
J.M. Gillis
Pauline Hingston
Susan Janssens
Theresa Johnstone
Geraldine Kearns
Tam Lam
Dennis Leith
C.J. MacDonald
Glenda MacKinnon
Thomas Maher
Hugh McGinn
Colleen McNeil-Long
Margaret Murray
Donna O'Leary
Ardeth Reardon
Mary Reno
Bonnie Salsman
Marilyn Stanford-Zinck
M.H. Taylor
Nadine Wentzell
Donna Wheeler-Usher

New Brunswick

Alan Cameron
Russell Crowell
Joanne Dewly
Georgena Hayes
Gordon Kane
Pam McLean
Mary Murphy
Monique Pitre
Guy Plourde
Valerie Stairs
Roy Steeves
Emily Somers
Barbara Winsor

P.E.I.

Roy Boats
L.A. Semple

The pharmacists listed below have given their time and expertise to the Clinical Clerkship during 1983-1984. During the Clerkship the fourth year students attend conferences and clinical drug rounds at participating hospitals and learn to apply clinical pharmacy principles.

Halifax Infirmary

Catherine E. Bennett
Vincent L. Heighton
Pauline M. Hingston
Tam Lam

Camp Hill Hospital

Jane L. Burk
Janet M. Cooper
Janice M. Dillman
Susan J. Lord-Ferguson
Bonnie M. Salsman
C. Brian Tuttle

Izaak Walton Killam Hospital for Children

Sylvia K. Bell
Brian R. Dillman
Alexa L. Donald
Geri M. Kearns
Margaret S. Murray
Ardeth M. Reardon

Victoria General Hospital

Deborah M. Birch
Rita K. Caldwell

Formal pharmacy education in the maritime provinces began in 1908, with evening classes in pharmacy and chemistry conducted in the Nova Scotia Technical College. Success of these classes encouraged the Nova Scotia Pharmaceutical Society to establish the Nova Scotia College of Pharmacy in 1911. The College was affiliated with Dalhousie University in 1912.

The New Brunswick Pharmaceutical Society and the Prince Edward Island Pharmaceutical Association were admitted to affiliation with the College on 1917 and 1950, respectively. With the affiliation of the former society, the College was renamed the Maritime College of Pharmacy.

In 1961, the Maritime College of Pharmacy was admitted into Dalhousie University as the College of Pharmacy, a constituent part of the new Faculty of Health Professions. A four year program leading to the degree of Bachelor of Science in Pharmacy (BSc (Pharm.)) was introduced. Presently the undergraduate program, which admits 66 students into the first year, is moving to a patient-oriented curriculum in which clinical pharmacy is integrated with the pharmaceutical sciences.

In 1966, a Master's program was established, followed by a Doctor of Philosophy program in 1977. More information on the graduate program may be obtained from the Faculty of Graduate Studies Calendar. A graduate program in the areas of professional practice is being considered.

In 1972, a twelve month pharmacy residency program was initiated by Camp Hill Hospital in cooperation with the College of Pharmacy. Programs were initiated at the Halifax Infirmary in 1974, at the Victoria General Hospital in 1981 and at the Saint John Regional Hospital in 1982. The programs orient the resident to various aspects of institutionalized health care with emphasis placed on drug therapy in patient care. They provide an opportunity for the residents to use professional judgement in evaluating drug information, drug therapy and in communicating with members of the health professions and with patients. A certificate is issued to candidates successfully completing the pharmacy residency program. Programs at the Camp Hill Hospital and the Halifax Infirmary are accredited with the Canadian Hospital Pharmacy Residency Board.

George A. Burbridge Pharmacy Building

In the fall of 1968, the College of Pharmacy moved into the George A. Burbridge Pharmacy Building. This building, the former Medical Sciences Building, was renamed in honour of the first Dean of the College, in recognition of his contribution to pharmacy education in the Maritimes. Present facilities accommodate approximately 260 undergraduate and 12 graduate students.

The pharmacy library houses 6,584 bound volumes, 9,740 microforms, and receives almost 280 subscriptions relating to pharmacy and allied sciences.

Adjacent to the library is an area established for the preservation of pharmaceutical archives. The archives include a collection of historical pharmaceutical implements, containers, records and preparations.

Career Opportunities

Pharmacy is a health science concerned with many aspects of the use of drugs for the health care of the patient. This includes the preparation of suitable materials for use as medicines from natural and synthetic sources; the compounding of drugs and the dispensing of suitable medication; the taking of medication histories; keeping patient drug profiles; counselling patients on their prescribed medication; educating patients on their self-medication habits; monitoring drug interactions, drug side-effects, and the patients' compliance with their drug treatment; and the provision of information on drugs to other health professionals.

Pharmacy graduates have a wide range of career opportunities. The majority enter community pharmacy practice. Hospital pharmacy also provides an interesting challenge for pharmacists, particularly in view of their expanding role within the clinical setting. The pharmaceutical industry provides opportunities for pharmacists in the fields of sales, production, research and quality control.

The increased role of federal and provincial governments in public health has provided opportunities for pharmacists in analytical laboratories and in administrative positions as government inspectors and health supplies officers. Opportunities may also be available in universities as teachers and researchers.

A Bachelor of Science in Pharmacy is necessary for those who wish to practice as pharmacists. For those who wish to enter research or teaching, a Master of Science degree or further postgraduate study is usually required.

Licence in Pharmacy

The College of Pharmacy, being purely educational, has no jurisdiction in matters relating to licencing or to registration as a Pharmaceutical Chemist. These functions are entirely under the control of the provincial licencing body concerned. A period of practical training or apprenticeship is required before a graduate in pharmacy is licenced as a pharmacist. Information regarding licencing or registration in each province may be obtained from the respective provincial society: the Registrar of the New Brunswick Pharmaceutical Society, 1077 St. George Blvd., Suite 305, Moncton, N.B. E1E 4C9; the Registrar of the Prince Edward Island Board of Pharmacy, PO Box 1084, Charlottetown, P.E.I. C1A 7M4; or the Registrar of the Nova Scotia Pharmaceutical Society, 1526 Dresden Row, PO Box 3363, Halifax South Postal Station, Halifax, N.S. B3J 3J1.

Pharmacy Examining Board of Canada (PEBC)

The Pharmacy Examining Board of Canada was created by Federal Statute, on December 21, 1963, to establish qualifications for pharmacists acceptable to participating pharmacy licencing bodies. The Board provides for annual examinations and issues a certificate to the successful candidate which may be filed with a Canadian provincial licencing body in connection with an application for licence to practice pharmacy under the laws of that province. Baccalaureate graduates from the College of Pharmacy are eligible to write these examinations. Information relative to the dates of examinations, application forms, etc., may be obtained through the Director's office, College of Pharmacy.

Student Pharmacy Society

The basic aims of the Student Pharmacy Society are to promote a closer liaison with the other societies on campus, to give the pharmacy students a strong position with regard to Student Council activities, to provide a means of communications between students and their respective licencing bodies in the Maritimes, and to provide an organizational body which plans and finances the various unique Pharmacy Society activities.

Membership in the Pharmacy Society includes membership in the Canadian Association of Pharmacy Students and Internes and representation in the Canadian Pharmaceutical Association.

Entrance Requirements

The general requirements for admission to the Faculty of Health Professions are described in the General Undergraduate Information and Regulations section of this calendar. Applicants should note that admission is on a competitive basis so that final selection of candidates usually is based upon higher than the minimum academic requirements. Students with advanced standing or degrees are not given preference for admission. Enrolment is limited by the number of laboratory places available. Because this is the only College of Pharmacy for the Maritimes, preference is given to Maritime residents.

In order to be qualified for admission, students must have senior matriculation (or equivalent) standing in chemistry, English, mathematics, and either biology or physics plus one other subject.

Applicants must write the Pharmacy College Admissions Test (PCAT). Information on test dates, testing centres and test format may be obtained by writing PCAT, Psychological Corp., 7500 Old Oak Blvd., Cleveland, Ohio, 44130. Applicants are required to write the test no later than the February sitting. An academic screening is done and selected applicants are interviewed.

Application forms may be obtained from the Admissions Office of Dalhousie University. Information regarding credit for advanced classes may be obtained from the Registrar. Application forms must be submitted before the deadline indicated in the enclosed Almanac. A non-refundable application fee is required.

Deposit

Because of the large number of applicants, a deposit is required from accepted students to show proof of intent to register with the College of Pharmacy. A non-refundable deposit of \$100.00 (applicable to tuition fees) is payable by the application deadline, or within three weeks of notification of acceptance for those accepted after that date.

Services

University services and services to students are outlined in the General Information Section of the Calendar.

Regulations

University Regulations

All students must observe the University Regulations as outlined in the General Information and the General Undergraduate Information sections of this Calendar.

Faculty of Health Professions Regulations

All students must observe the Faculty of Health Professions Regulations as outlined in the Health Professions Regulations section of this Calendar.

College of Pharmacy Regulations

There is within the College of Pharmacy, a Committee on Studies.

When the work of a student becomes unsatisfactory or his attendance irregular, the student may be required to discontinue and be excluded from the class concerned.

If laboratory work or assignments are not completed in a satisfactory manner in any class or classes, credit for the class is withheld until all work has been satisfactorily completed.

In the case of failure in the laboratory portion of a pharmacy class, there is no supplemental privilege and the laboratory, together with the corresponding lecture portion of the class, must be repeated.

At the beginning of January, the results obtained by each student will be reviewed. Any student who has not shown reasonable proficiency in the Christmas examinations may be required to withdraw from the College of Pharmacy for the remainder of the session or to reduce the number of classes being taken.

As an academic requirement, students are assessed in each year on their aptitude and fitness for the profession of pharmacy. A student who, in

the judgement of the Faculty, fails to attain a satisfactory standard in the assessment may be retired from the College of Pharmacy.

A student withdrawing from the University or intending to discontinue any class or classes must have the approval of the Director of the College of Pharmacy and must also notify the Registrar.

Each student, before registration each year, must have program approval from the College of Pharmacy. In seeking this approval the student should have determined eligibility for the proposed classes by satisfying the prerequisites prescribed. In choosing elective classes in the final year, the student should note the intent that the electives should prepare the graduate for specified areas of practice.

Grading System

Grade Points Grades are reported using a letter grading system set forth in Health Professions General Regulation 2.1, and grade point averages are computed as provided for in the same regulation. It should be noted that the letter grades of F, FM, W, INC and NP are counted as zero grade points. The yearly academic performance of all students is assessed by June 1st each year.

Credit Hours

A passing grade, including a pass obtained on supplemental examination, in a credit class must be achieved in order to accumulate credit hours.

For classes offered by the College of Pharmacy, one credit hour is defined as one hour of lecture per week per term, or three hours of laboratory per week per term.

Yearly Academic Requirements

In each year of studies, a student must obtain a minimum grade point average (GPA) of 2.00 and accumulate at least 18 credit hours. If enrolled as a part-time student, the number of credit hours registered and accumulated must be the same.

At the end of the second and subsequent years, a student must also have a minimum cumulative GPA of 2.00.

Requirements for Professional Classes

A student must obtain a grade of at least C in each professional class for that class to be counted as credit for the degree or as a prerequisite for another professional class. A student who earns a grade of less than C in a professional class but is still eligible to continue in the College of Pharmacy must repeat that class until a grade of C or better is obtained.

Requirements for Degree

To satisfy the requirements for the degree of Bachelor of Science in Pharmacy a student must:

accumulate at least 134 credit hours (or its equivalent for transfer students), with an overall (cumulative) GPA of at least 2.00 in the prescribed classes; and

accumulate at least 104 credit hours (or its equivalent for transfer students), with an overall (cumulative) GPA of at least 2.00 in the prescribed professional classes.

Note: For lists of prescribed and professional classes see the sections "Classes of Instruction" and "Prescribed Classes."

Degree with distinction

The degree, Bachelor of Science in Pharmacy with distinction is explained under 2.5 of Faculty Regulations.

Summer School Classes

The mark that a student receives in a summer school class is used in calculating the GPA of the next academic year.

Failure to meet the requirements

Students who fail to meet the yearly academic requirements may be allowed to proceed on probation for the next academic year, providing their yearly GPA is at least 1.80 (1.60 in first year) and they have accumulated at least 18 credit hours in their current year of study; otherwise they must withdraw from the College of Pharmacy. Students who fail to meet the cumulative GPA requirements must withdraw from the College of Pharmacy.

Students required to withdraw from the College of Pharmacy are not allowed to register in any Pharmacy classes unless they have been readmitted or approval to take the classes has been granted by the Faculty of the College.

Probation

A student whose marks fall to the probation level for the second time must withdraw from the College of Pharmacy. If subsequently readmitted the student must maintain a minimum GPA of 2.00 or withdraw from the College.

These decisions and conditions of probation would normally be made by the Committee on Studies. However, the Committee will consider any written appeal.

Supplemental examinations

Supplemental examinations may be permitted only when a student meets the Faculty Requirements and has a GPA of not less than 1.80 (1.60 in first year).

Failing a class twice

Any student failing a professional class for the second time must withdraw from the College of Pharmacy.

Remedial examinations

A student who has met the yearly academic requirements but has a D in one professional class, and no failures, at the discretion of the Committee on Studies and the professors of the class, may be allowed to raise the grade to an acceptable level through a remedial examination, subject to the following regulations:

Remedial examinations will be allowed for not more than six credit hours of class work in a student's program.

Remedial examinations will be written at a time specified by the department offering the examination. However, this must be before September 1 immediately following the class.

On successful completion of a remedial examination, a grade of C is entered on the student's record along with the notation that the C was earned by examination. In the case of a failure an F is entered. The final mark recorded will be used for grade point average calculations, for the past academic year. However, the original grade of D also remains on the transcript.

Appeals

Students wishing to appeal a decision based on faculty regulations should request from the Director the appeal procedure.

Prescribed Classes

The program of prescribed classes results from a reorganization of the pharmacy curriculum first implemented in the academic year 1978-1979. All students entering the College of Pharmacy in that year or following years are required to complete this program.

All classes in this program are offered within the normal academic year with the exception of Pharmacy 3000B. Pharmacy 3000B includes a practical training program which the student must complete on a full-time basis in a pharmacy, normally during the month of May following the third year of study.

The following are descriptions of classes which are expected to be offered in the academic year 1985-1986

First Year: Pharmacy 1100, Pharmacy 1700B, Anatomy 101C, Chemistry 112, Mathematics 1060A, Mathematics 1000B and an elective.

Second Year: Pharmacy 2100, Pharmacy 2500B, Chemistry 2400, Microbiology 3020 and Physiology 2010.

Third Year: Pharmacy 3000B, Pharmacy 3100B, Pharmacy 3250A, Pharmacy 3300C, Pharmacy 3310A, Pharmacy 3500, Biochemistry 3100 and Pharmacology 3470 or 3480.

Fourth Year: Pharmacy 4100C, Pharmacy 4500, Pharmacy 4700A, Pharmacy 4710B, Pharmacy 4930B, Pharmacy elective and an approved elective designed to prepare the student for the fields of community practice, hospital pharmacy, industry, or graduate studies.

Classes of Instruction

Professional Classes

Ph 1100 Pharmaceutics I: B. Smith, 9 credit hours; lecture: 4 hours first term and 3 hours second term; tut.: 1 hr.; lab: 3 hours An introduction that includes a preliminary description of the functions of a pharmacist in practice and an introduction to communication techniques. The major lecture topics are pharmaceutical calculations, dosage forms, and basic compounding and dispensing techniques. A programmed text approach to medical terminology is also included. Laboratory work consists of compounding and dispensing representatives of the dosage forms discussed in class. Dispensing labs and communication skill seminars are compulsory parts of this class. Failure to complete the labs or the communications portion will result in an incomplete on the transcript.

Ph 1700B Pharmacy Administration I: J.G. Duff, 3 credit hours, lecture 3 hours. An introduction to the history of Pharmacy, Pharmacy organization, law, and business management.

Ph 2100 Pharmaceutics II: staff, 10 credit hours, lecture 4 hours, lab 3 hours. Prerequisites: Pharmacy 1100, Chemistry 112 and Mathematics 1000B. A continuation of Pharmacy 1100 that includes a discussion of liquid dosage forms, dispersed systems, sterile preparations and biopharmaceutics. Lectures and labs stress the practical applications, the scientific principles, and calculations related to these topics. Dispensing labs and communication skill seminars are compulsory parts of this class, failure to complete either will result in an incomplete on the transcript.

Ph 2500B Introduction to Therapeutics: J. Taylor and M. Mezei, 2 credit hours, lecture 2 hours second term. An introduction to therapeutic and prophylactic use of prescription and over-the-counter (OTC) drugs. Patient counselling is emphasized along with knowledge of drug products and disease states.

Ph 3000B Practical Training Program: J. Taylor, 4 weeks (140 hours). Prerequisite: completion of third year. A structured practical training program consisting of four consecutive weeks to be completed in May, after the third year academic program. This program (which is conducted in the presence of a practicing pharmacist preceptor in both community and hospital pharmacies) studies prescription compounding and dispensing, nonprescription drugs and prescription accessories, patient counselling and communication, laws and regulations, management and administration as well as everyday practical problem solving. Emphasis is on all aspects of pharmacy relating to general practise.

Ph 3100B Pharmaceutics III: K.M. James, 2 credit hours, lecture 1 hour second term, lab 3 hours second term. Prerequisite: completion of second year. This class is concerned with the proper compounding and dispensing of pharmaceutical products.

Ph 3250A Pharmacokinetics: I. Abraham, 2 credit hours, lecture 2 hours first term. Prerequisite: Pharmacy 2100. A class designed to acquaint students with basic applied pharmacokinetics. Topics include general con-

cepts of one and two compartment models, linear and non-linear pharmacokinetics, drug kinetics after intravenous, intramuscular or oral administration, practical methods of one compartment model utilizing urinary data, multiple dosing kinetics, effect of renal impairment on drug kinetics, approaches to dosage adjustment in renal failure, effect of hepatic impairment on drug kinetics, pharmacokinetic factors influencing drug therapy in the elderly, pharmacogenetics, relationship between drug concentration and response and kinetics of pharmacologic response.

Ph 3300C Medicinal Chemistry: D.K. Yung and P.S. Farmer, 5 credit hours, lecture 2 hours, lab 3 hours second term. Prerequisite: Chemistry 240. Applications of the content of areas of chemistry to organic medicinal agents, and the design, chemistry, therapeutics, and pharmacological action of organic compounds used in medicine and the correlation of physiochemical properties and physiological action. The laboratory work consists of qualitative analysis of certain classes of drugs.

Ph 3310A Pharmaceutical Analysis: D.K. Yung, 3 credit hours, lecture 2 hours first term, lab 3 hours first term. Prerequisite: Chemistry 240. An introduction to the principles and methodology of drug product quality assurance. Topics include gravimetric, volumetric, chromatographic, and spectrophotometric methods of analyses of drug products.

Ph 3500 Therapeutics I: staff, 9 credit hours, lecture 5 hours. Corequisites: Pharmaceutics III, Pharmacology 3470, Microbiology 3020 and Pharmacy 3250A. Prerequisite: Pharmacy 2500B. Therapeutic and prophylactic use of prescription and over-the-counter (OTC) drugs are discussed. Patient interviewing and counselling are emphasized, along with knowledge of drug products and disease states.

Ph 4000 Pharmaceutical Investigation: 6 credit hours, a minimum of 6-8 hours per week. Prerequisite: Consent of the supervisor and approval by Committee on Studies. The Committee on Studies must approve the project before the student registers in the class. Library, laboratory and/or field investigations related to an area in pharmacy, carried out by an individual or a small group of students under the supervision of one or more faculty members. Projects should be submitted to the Committee on Studies well before registration, preferably before the end of the previous academic term. Presentation of a seminar on the completed project is required. Where appropriate, a bound thesis is submitted. A paper or a presentation which is prepared for this class may not be submitted for credit in any other classes.

Ph 4010A, 4020B, 4030C Directed Study in Pharmacy: 3 credit hours. Prerequisite: Consent of the supervisor and approval by the Committee on Studies. The Committee on Studies must approve the project before the student registers in the class. For a description of these half classes, see the full class Pharmacy 4000.

Ph 4220A, 4240B Dosage Formulation and Product Development: K.M. James, 3 credit hours, lecture 2 hours, lab, individual assignments, minimum students 4. Prerequisite: Pharmacy 2100 and consent of instructor. Application of physiochemical and technical knowledge in the development of pharmaceutical products.

Ph 4100C Pharmaceutics IV: staff, 5 credit hours, Prerequisites: Pharmacy 3100B, Pharmacy 3250A and Pharmacy 3500. This class deals with topics in clinical pharmacokinetics, radiopharmaceutics and drug interactions.

Ph 4230A Dermopharmacy: M. Mezei, 3 credit hours. Prerequisite: Consent of instructor. Topics include skin diseases and topical therapy.

Ph 4500 Therapeutics II: staff, 13 credit hours, lecture, 7 hours first term and 2 hours second term, clerkship 40 hours, tutorial 2 hours. Prerequisites: Biochemistry 3100, Pharmacology 3470 or 3480, Therapeutics I and consent of instructor. A discussion of the application of pharmaceutical scien-

ces to various diseases, therapeutic use of drugs and drug-induced disease is presented. Conferences and clinical drug rounds are conducted at participating hospitals in conjunction with instruction in and application of clinical pharmacy principles.

Ph 4700A Pharmacy Administration IIA: R.M. Sparkman, 3 credit hours. Prerequisite: Pharmacy 1700B. This course is intended to provide introductory business training to prepare the student to manage a retail or hospital pharmacy. Students will be exposed to financial analysis, capital budgeting, marketing, organizational behaviour and decision making.

Ph 4710B Pharmacy Administration IIB: K.M. James, 3 credit hours. Prerequisite: Pharmacy 4700A. Consideration of socioeconomic factors that affect the practice of Pharmacy. A review of ethics, standards of practice and pharmacy legislation, followed by student presentations on current socioeconomic topics. Each presentation is evaluated by a panel of students and practicing pharmacists.

Ph 4800 Hospital Pharmacy: M.E. MacCara and R.A. Merrett, 6 credit hours, lecture 2 hours, lab as assigned. Prerequisite: Consent of instructor. A study of the purposes, functions, and responsibilities of the pharmacy department in the hospital. Emphasis is on current concepts in hospital pharmacy such as unit dose drug distribution, clinical pharmacy services, intravenous (IV) admixture services, total parenteral nutrition and drug information services. Tours of hospital facilities in the first term familiarize the student with the services they provide. Laboratory work in the second term gives practical experience using aseptic technique in the compounding of IV admixtures and total parenteral nutrition preparations.

Ph 4930B Introductory Drug Metabolism and Toxicology: 2 credit hours, lecture 2 hours second term. Prerequisites: Biochemistry 3100, Pharmacology 3470 or 3480 and Therapeutics I. An introduction to drug metabolism and general and clinical toxicology.

Ph 4320A or B Pharmaceutical Analysis and Control: D.K. Yung, 3 credit hours, lecture 2 hours, lab 3 hours. Prerequisite: Consent of instructor. A study of the theory and practice of quantitative analytical techniques used in the analysis and control of drugs and finished pharmaceutical dosage forms with emphasis on modern instrumental methods.

Ph 4330C Herbal Remedies: R.F. Chandler, 3 credit hours, lecture 2 hours first term, 1 hour second term. Prerequisite: Consent of instructor. Topics concerning natural products of plant origin of pharmaceutical and/or medicinal importance are discussed, including historical highlights, native and folklore usage, herbal "health foods," and poisonous plants of significance to our geographical area. In addition, an introduction to chemistry, biosynthesis and general extraction, purification, and identification techniques is presented for the carbohydrates, glycosides, lipids, volatile oils, alkaloids, and some miscellaneous compounds.

Ph 4340C Drug Design: P.S. Farmer, 3 credit hours, lecture 2 hours first term, 1 hour second term. Prerequisite: Pharmacy 3300C or consent of instructor. The principles of drug design are studied. The increasing role of biochemical knowledge in lead generation is emphasized, followed by consideration of available lead exploitation methods. The methodologies and significance of particular design strategies, including prodrugs, "soft" drugs, structurally rigid analogs and substituent constant analysis, are examined in some depth, with examples and problems. The discovery processes that have led to selected new drugs are examined critically.

Ph 4900B Studies in Drug Information: M.E. MacCara and I.S. Sketris, 3 credit hours, lecture 3 hours, minimum students 4. Prerequisite: Consent of instructors. A study, through lectures, seminars and reading assignments, of

the essentials of drug information services. Study and application of common principles of drug literature retrieval, evaluation and communication result from confrontation with actual questions regarding drugs and drug products based on clinical practice.

Ph 4910B Drug Metabolism: 3 credit hours, lecture 2 hours/week for 14 weeks, open to 4th year pharmacy students and graduate students. Prerequisite: Consent of instructor. The biotransformation of drugs and other foreign compounds in humans and animals is examined. The isolation and characterization of metabolites and the biochemical mechanisms of drug metabolism at subcellular or molecular levels are discussed. Emphasis is on the relationship between drug biotransformation and the therapeutic and/or toxic effects of drugs.

Ph 4920B General Toxicology: 3 credit hours, 2 hours/week for 14 weeks, open to 4th year pharmacy students and graduate students. Prerequisite: Consent of instructor. The various disciplines of toxicology and the fundamental principles governing the interaction of toxic chemicals and biological systems are covered. The toxic effects and the biochemical mechanisms underlying the toxic manifestations of various chemicals such as drugs, carcinogens, teratogens, heavy metals, insecticides, pesticides, and industrial solvents, will be discussed in detail.

N 4800B/Ph 4950B/HE 2250B/PT 3090B Interdisciplinary Course in Human Nutrition: 3 credit hours, normally spring term, E. Lambie. Prerequisite: Biology 1000 or at the discretion of the professor. For description, see PT 3090B.

Ph 4960A, 4970B/N 4900A, N 4910B/OT 4417A, OT 4418B/PE, HE, REC 4498A; PE, HE, REC 4499B/PT 4300A, PT 4901B An Interdisciplinary Approach to Gerontology: Two separate classes, dealing with social and health perspectives, respectively. See N 4900A and N 4910B for description.

Biochemistry 3100: D.W. Russell, 6 credit hours, lecture 3 hours; L.C. Stewart, lab 3 hours. Prerequisite: Chemistry 2400. A study of the chemistry of living organisms. Topics include the organic and physical chemistry of macromolecules, with special reference to proteins; the catalytic activities of enzymes; the energy-yielding pathways of metabolism; bio-synthesis of nucleic acids and proteins; the control of metabolism. Emphasis is on an understanding of the concepts and methods of biochemistry, and on the evidence for accepted conclusions. The laboratory class includes experiments designed to consolidate the students' knowledge of pH and buffers, experiments with selected enzymes, some metabolic experiments with radioactive glucose, an investigation of the properties of deoxyribonucleic acid, assay of a vitamin, and an antigen-antibody test for pregnancy.

Anatomy 101C: R.A. Leslie, 3 credit hours, lecture 4 hours. Taught by the Department of Anatomy and designed exclusively for students in the Health Professions and Dental Hygiene.

Physiology 201: staff, 6 credit hours, lecture 3 hours, tutorial 1 hour. Prerequisite: Anatomy 101C or permission of the Committee on Studies. Text: E.E. Selkurt, *Basic Physiology for the Health Sciences*, Little, Brown and Co., 1975. Taught by the Department of Physiology, dealing with functions of various systems of the body, with special reference to the human. While the primary aim is to acquaint the student with normal mechanisms, frequent references are made to diseased functions.

Microbiology 3020 General Microbiology: For class listing, see under Microbiology in the Arts & Science section of this calendar.

Pharmacology 3470 The Influence of Chemical Agents on Living Organisms: staff, 6 credit hours, lecture 3 hours. An introduction to the actions of drugs on physiological and biochemical functions of man and

lower animals. The basic mechanisms of actions and structure-activity relationships of various groups of pharmacological agents are stressed and, wherever possible, discussed at the molecular and macro-molecular level of cell organization. Factors influencing the absorption, distribution, biotransformation, and excretion of drugs are discussed, as are potential uses.

Pharmacology 3480 The Influence of Chemical Agents on Living Organisms: staff, 6 credit hours, lecture 3 hours, lab Wed. 2:30-5:00 p.m. Prerequisite: Consent of course coordinator. The lecture class (Pharmacology 3470) is augmented by a practical laboratory class designed for student participation in the demonstration of basic principles of pharmacology.

Other Prescribed Classes

Note: For class descriptions of the following classes, see under the respective departmental sections of the Arts & Science segment of this calendar.

Chemistry 112 General Chemistry

Chemistry 240 Introductory Organic Chemistry

Mathematics 1060A Introductory Statistics for non-Mathematicians

Mathematics 1000B Differential and Integral Calculus

Electives

The first year elective may be any approved credit class. The student should discuss the available electives with his or her faculty counsellor. Electives for the fourth year of study must be of advanced standing and approved by the student's faculty counsellor.

College of Pharmacy Scholarships, Awards, Bursaries, Prizes and Loans

In determining the recipients of scholarships and medals, the total of each letter grade (A+, A, A-, etc.) will be used, as well as the grade point average. Details of scholarships, awards, bursaries, prizes, and loans are found in the university publication, *Scholarships, Prizes, and Financial Aid*, available on request from the awards office.

School of Physiotherapy

School of Physiotherapy Academic Staff, 1984-85

Robert S. Tonks, B Pharm, PhD (Wales), FPS, FI Biol., Dean of the Faculty of Health Professions

David A. Egan, MCSP, Dip TP, (Lond.), MSc (UWO), Director and Professor

Associate Professors

C.W. Kenneth Hill, MCSP, Dip. TP (Lond.), MSc (Dal)

Hazel A. Lloyd, MCSP, Dip. TP (Lond.), BPT (Alta.)

James C. Wall, BSc (Lond.), MSc (Surrey), MEd (Tor.), PhD (Lond.)

Assistant Professors

Cheryl L. Kozey, BPE (UNB) MSc (Waterloo)

Lydia Makrides, MCSP (Lond.), BPT (Sask.), MSc (Ottawa)

George I. Turnbull, MCSP, Dip. TP (Lond.), BPT (Man.)

Lecturer

Brian M. Westers, MCSP (Lond.), BPT (Man.)

Faculty Honorary Appointments To Clinical Facilities

Cheryl L. Kozey, BPE (UNB), MSc (Waterloo), (*Nova Scotia Sports Medicine Clinic*)

G.I. Turnbull, MCSP, Dip. TP (Lond.), BPT (Man.), (*Victorial General Hospital*)

Honorary Appointments

J.W. Kozey, MSc (Waterloo), Research Director, Nova Scotia Sport Medicine Clinic

B.R. MacKenzie, MD, FRCP (C) Associate Professor, Department of Medicine

J.J. Murray, MD, FRCP (C) Professor, Department of Medicine

W.D. Stanish, MD, FRCS (C), Assistant Professor, Department of Surgery

J.F.L. Woodbury, MD, FRCP (C), FACP, Professor, Department of Medicine

Provincial Clinical Coordinators

B. Boucher, BSc (PT) (Queen's) *New Brunswick*

J. O'Dea, BSc (PT) (McGill) *Newfoundland*

Clinical Placement Programs

The following physiotherapy department Supervisors/Directors and their staff give their time and expertise to a structured student clinical placement program.

Nova Scotia: Metro

J.G. Brachaniec, MCSP — Camp Hill Hospital

B. Dolomont, Dip. Phys. Ther. (Alta.) — Dartmouth General

M.C. Merlin, BPT (McGill) — Halifax Infirmary

S.E. Quackenbush, Dip. Phys. Ther. (Dal) — IWK Hospital for Children

J.L. Schaffner, BSc PT (McGill) — N.S. Rehabilitation Centre

V.I. Zwerling, Dip.Phys.Ther. (Dal) — Victoria General Hospital

Nova Scotia: Provincial

Linda Burke — North Sydney, North Harbour View Hospital

Rachel Framptom — Yarmouth Regional Hospital

Wendy Jeans — Colchester Hospital, Truro

Dan Kerr — Aberdeen Hospital, New Glasgow

Paulette McKenna — Glace Bay Community Hospital

Gayle Ogilvie — Fisherman's Memorial Hospital, Lunenburg

Darlene White — Highland View Regional Hospital, Amherst

New Brunswick:

David Baird — Forest Hill Rehabilitation Centre, Fredericton

Louis Goguen — Dr. George Dumont Hospital, Moncton

Patrick Greechan — Chalmers Hospital, Fredericton

Judith Hughes — Moncton City Hospital

Nancy McKay — Chaleur General Hospital, Bathurst

Suzanne Stalder — Oromocto Public Hospital

Rebecca Tooley — St. John Regional Hospital

Newfoundland:

Keith Ambler — Western Memorial Hospital, St. John's

Gwyn Barrowman — Salvation Army Grace Hospital, St. John's

Georgie Brown — Dr. C.A. Janeway Child Centre, St. John's

Noel Brown — Carbonear General Hospital

Lynn Crosbie — The Children's Rehabilitation Centre, St. John's

Marianne Harvey — James Paton Memorial Hospital, Gander

Maude Scott — St. Clare's Mercy Hospital, St. John's

Prince Edward Island

Janet Rogers — Queen Elizabeth Hospital, Charlottetown

The School of Physiotherapy was established in 1963. A two-year program leading to a Diploma in Physiotherapy was offered by Dalhousie, the course of study being followed by a compulsory five-month internship period prior to eligibility for licence to practise physiotherapy. This Diploma program was terminated at the end of the 1976-77 academic year. In 1975 the Senate of Dalhousie approved the implementation of a four-year program leading to a Bachelor's Degree. The BSc (Physiotherapy) degree which replaced the Diploma program comprises a general Arts and Science first year with required subjects followed by three professional years of study as outlined. During this course of study clinical training is undertaken. Whilst primarily concerned with a commitment to graduate academically and clinically highly qualified physiotherapists, the school also offers non-credit work shops and seminars as part of a continuing education program for graduates in Physiotherapy.

The School also offers a post-diploma program which enables Diploma holders to obtain a BSc (Physiotherapy).

Affiliated Institutions

At present clinical instruction and practice during the course of study is undertaken with the guidance of clinical instructors in the following centres: Camp Hill Hospital, Grace Maternity Hospital, The Halifax Infirmary, The Izaak Walton Killam Hospital for Children, The Nova Scotia Rehabilitation Centre, The Dartmouth General Hospital, The Victoria General Hospital and a variety of other placements including clinics in Newfoundland and New Brunswick.

Field Experience

Throughout the course of study students learn to apply their academic knowledge in a variety of situations. During the summer following the second year of study a brief period of orientation is undertaken to familiarize the students with the clinical environment in preparation for the clinical experience which follows in the third and fourth years. During these last two years, students are engaged in clinical practice under the guidance of clinical instructors. During these clinical placements the student's performance is evaluated by the staff of the Physiotherapy Department in which they are practising and students must maintain a satisfactory level of performance together with demonstrated suitability to pursue a career in Physiotherapy. A compulsory period of clinical practice between the third and fourth years offers the student the opportunity to obtain experience in Canada. The students choose specific situations from amongst accredited departments in which they wish to be placed and the School, in conjunction with the Canadian Physiotherapy Association, seeks to place the students in the areas chosen. A list of approved clinical placements is maintained by the Association.

Career Opportunities

The profession of Physiotherapy (or Physical Therapy) offers a varied, interesting and worthwhile career to both men and women in a variety of settings. Upon graduation most Physiotherapists work in hospital-based departments rotating through various areas of interest prior to becoming more deeply involved in any specific area. Opportunities are available in rehabilitation centres, extended care units, special schools, or with local government agencies, industrial health units, sports clubs and private clinics. Alternatively, experienced physiotherapists may operate a private practice. Interested persons can pursue careers leading to Graduate Degrees in related areas proceeding to teaching and/or research. A limited number of graduate programs in Physiotherapy are available at universities in Canada.

Licence to Practise Physiotherapy

Physiotherapists practising in Canada must be licensed with the appropriate Provincial Licensing Body. The school itself has no jurisdiction in matters related to licensing, and Dalhousie University cannot accept responsibility for changes in licensing regulations which may occur from time to time.

The Canadian Physiotherapy Association (CPA), the national professional physiotherapists' organization, recommends minimum academic and clinical curriculum content for membership. The degree course at Dalhousie University is designed to fulfill the present requirements by the time the students graduate. Membership or eligibility for membership in the CPA entitles the Physiotherapist to apply for Provincial licensing through the appropriate provincial body. At present an examination for registration is not necessary for graduates of Canadian Physiotherapy Schools.

Student's Society

The Physiotherapy Students' Society gives incentive to the students to participate in school, campus and community activities and to participate in both local and national professional activities.

Regulations

(See also Faculty Regulations)

1. All students are required to observe the University regulations and the Faculty regulations as described in this Calendar.
2. Regular and punctual attendance at classes is required of all students. When the work of a student becomes unsatisfactory or if attendance is irregular, the student may be required to withdraw from the School.
3. Promotion each year is contingent upon satisfactory academic and clinical performance.
4. Students whose clinical performance is repeatedly unsatisfactory may be required to withdraw from the School.
5. Except in special circumstances students may not carry a course load in excess of the normal load as set down in the calendar of the School of Physiotherapy. A full course load is 36, 30 and 30 credit hours in Years II, III and IV respectively.
6. Students are normally required to complete the requirements for their degree within six years of initial registration in the School of Physiotherapy.

Supplemental Privileges (see regulations)

In addition to meeting the normal requirements of this Faculty, supplemental privileges may be granted provided the student has met the minimum required Grade Point Average (GPA) for the year, and provided the student has attained a marginal fail grade (F/M) in that class for which this privilege is to be granted.

A maximum of one supplemental can be permitted in any one year, and a maximum of three can be permitted throughout the whole course of study. Students who fail their year may be required to repeat the whole year or withdraw from the School of Physiotherapy.

Students who fail a class on two occasions are not permitted to repeat the class and thus must withdraw from the School of Physiotherapy.

Failed Year

The student is considered to have failed the year under the following conditions:

1. If the student has failed to meet the required GPA for that year.
2. If more than one supplemental is required.

Students who fail their year may be required to withdraw from the School or to repeat their full year of study. Supplemental privileges are not granted in a repeated year.

Credit Hours

Each full class is assigned a value of six credit hours, and each half class is assigned a value of three credit hours.

Grading System

The passing grade is D except in clinical courses. See Faculty of Health Professions Regulations.

Grade Point Average Requirements

A Student must obtain a minimum yearly GPA of 2.0 and a cumulative GPA of 2.0 or higher in the School of Physiotherapy (see General Regulations, Faculty of Health Professions 2.1) To satisfy the requirements for the Degree of Bachelor of Science in Physiotherapy, a student must accumulate at least 138 credit hours (or its equivalent for transfer students).

Withdrawal

Students who voluntarily withdraw, having satisfactorily completed courses toward the BSc (Physiotherapy) degree, with the intention of returning at a later date are advised that re-acceptance is contingent upon there being an available place.

Appeal

A student wishing to appeal a decision based on School regulations should in the first instance attempt to resolve the issue with the instructor(s) concerned, before proceeding as per Health Professions Regulation 2.7.

Degree with Distinction

See Faculty of Health Professions Regulations.

Association Membership

Information regarding membership in the various Physiotherapy Associations is obtainable from the following sources: The Canadian Physiotherapy Association (44 Eglinton Ave. W., Suite 20, Toronto, Ontario, M4R 1A1); The Chartered Society of Physiotherapy (14 Bedford Row, London, WC1R 4ED, England); The American Physical Therapy Association (1111 North Fairfax St., Alexandria, Virginia, 22314, U.S.A.); The World Confederation of Physical Therapy, Secretary General (16/19 Eastcastle Street, London, W1N 7PA, England); The Canadian University Service Overseas, (CUSO) (151 Slater Street, Ottawa, Ontario, K1P 5H5).

Scholarships, Bursaries and Prizes

Details of scholarships, prizes, bursaries, and loans may be found in the Dalhousie Awards Office Publication "Scholarships, Prizes, and Financial Aid."

Degree Programs

BSc (Physiotherapy) Degree Program

The program for the BSc (Physiotherapy) Degree is composed of a minimum of four years of study at University.

Application for Admission

The minimum academic requirement for entry into the first Professional Year of the BSc (Physiotherapy) program is successful completion of first year in the Faculty of Arts and Science at Dalhousie University or the equivalent at another University (see Academic Requirements). Previous elective academic work transferred to the BSc (Physiotherapy) program must be not more than 10 years old at the time of graduation from the program.

Prospective candidates are strongly advised not to include classes of similar description and content as those offered in the second, third and fourth (professional) years. Students seeking exemption from classes are assessed on an individual basis. A limited number of places may be made available for students who already possess a degree and whose course work may not include the prerequisite years as described, and who in the opinion of the Admissions Committee have demonstrated that they may be considered suitable candidates to pursue a career in Physiotherapy. Such candidates are evaluated on an individual basis.

The deadline for receipt of applications for admission to the School of Physiotherapy is stated in the enclosed almanac. Selected applicants will be

asked to attend an interview. In addition, all applicants must undergo a medical examination to assess their fitness for the study and practice of Physiotherapy. Since the demand for admission exceeds the resources available, candidates are judged on a competitive basis. The decision of the admissions committee is final. Applicants are required to make arrangements to have an official copy of their final transcript for the current year sent as soon as it becomes available. We stress that it is the applicant's responsibility to see that all necessary documents are received by the School of Physiotherapy *as soon as possible*. Applicants with incomplete files will not be considered. *At present, owing to the limited enrollment and the large number of applicants, only residents of the Atlantic provinces can be considered for admission to the School of Physiotherapy.*

Deposit

Because of the large number of applicants, a non-refundable deposit of \$100.00 (applicable to tuition fees) is required from accepted students as proof of intent to register with the School of Physiotherapy. The \$100 is payable within three weeks of notification of acceptance.

Transfer Students

Students who wish to transfer to the School of Physiotherapy from another University course in Physiotherapy must submit a written request for transfer to the Chairman of the Admissions Committee of the School of Physiotherapy and enclose official transcripts from all colleges and universities attended as well as the calendar descriptions of all courses taken. Such requests are assessed on an individual basis. Admission is subject to the availability of a place. In order to obtain the BSc (Physiotherapy) degree from Dalhousie University, any transfer student admitted into the School must conform with Faculty Regulations.

Academic Requirements

First Year

During this year students are registered in the Faculty of Arts and Science at Dalhousie or in an equivalent course of study at another University. Applicants are advised that a minimum C standing in each class (Dalhousie or equivalent) is required for consideration for admission into the School of Physiotherapy. Possession of the minimum standing does not, however, guarantee admission owing to the competition for the limited number of places in the program.

Faculty of Arts and Science

The required course of study includes five full classes comprising two science classes (Chemistry, Physics or Biology), one social science class (Psychology, Sociology and Social Anthropology), and two electives, all of which must be transferable to the Faculty of Arts and Science at Dalhousie if taken at another university (see Arts and Science Regulation 13.) All prerequisite courses must be completed by the end of the normal academic year preceding the year of anticipated admission to the School of Physiotherapy. It should be noted that in order to fulfill the science requirement the two classes must be in different areas of science, i.e. both cannot be concentrated in one area.

Year 1: The classes in the *recommended* program at Dalhousie are as follows: Two classes from: Chemistry 1100, 1110, 1120, or 1200, Physics 1000 or 1100 or 1300, Biology 1000 or 2000 level and one class from: Psychology 1000 or 1010, Sociology and Social Anthropology 1200 and two Arts and Science electives.

Second, Third and Fourth Years: Students must obtain a minimum GPA of 2.0 in each of the final three years of study and an overall final GPA of at least 2.0. Additionally, promotion to the fourth year of study is contingent upon a satisfactory clinical report with regard to the summer internship period between the third and fourth years of study (PT 3500B).

Faculty of Health Professions

Required Classes

Year II: Physiology 2030R, Physiotherapy PT 2021A, PT 2041B, PT 2051B, PT 2061C, PT 2062R, PT 2070A, PT 2080B, PT 2100B, PT 2160A. Four week summer clinical orientation.

Year III: Physiotherapy PT 3000A, PT 3010A, PT 3020B, PT 3030B, PT 3050A, PT 3060R, PT 3110B, PT 3120A, Psychology 2120A, Elective or PT 3070A/3080B, PT 3500B.

Year IV: Physiotherapy PT 4010A, PT 4020R, PT 4030B, PT 4060R, PT 4050B, Option PT 4110-4140A/B, Option PT 4210-4240A/B, Statistics, Elective.

Electives

All electives must be approved by the School of Physiotherapy. A fourth-year elective is expected to be beyond the 1000 level. Admitted students who have four full years of university study may be allowed credit up to a maximum of two classes. Students with three full years of university study may be allowed one class credit.

Students who have successfully completed, prior to admission, classes equivalent to the required classes in the program of study may apply for exemption by submitting the course outline to the department concerned (see Arts and Science Regulation 14). If granted, the student will be required to replace all such classes with those approved by the School.

Clinical Practicum

After the second year, students engage in a four week clinical orientation (May/June or Aug./Sept.). Throughout the third and fourth years, students engage in clinical practice under the guidance of clinical instructors. A compulsory full-time period of clinical practice is undertaken for approximately eighteen weeks between the third and fourth years (PT 3500B). Students must have settled all financial obligations to the University prior to undertaking any period of clinical practice.

Post-Diploma Program

In 1977, the Senate at Dalhousie University approved the implementation of a course of study which enables Diploma holders in Physiotherapy to obtain the BSc (Physiotherapy) degree.

Application for Admission

Application for admission is made through the office of the Registrar and the deadline for receipt of applications is published in the enclosed almanac. The enrollment is strictly limited, however, the School may consider late applications if appropriate resources prove available.

Students who apply must possess the normal admission requirements to Dalhousie University and *Either* (a) A Diploma in Physiotherapy from Dalhousie University *Or* (b) A Diploma in Physiotherapy from a recognized institution whose curriculum in the opinion of the Committee on Studies is at least equivalent to the Diploma Program at Dalhousie and which renders the Graduate eligible for full membership in the Canadian Physiotherapy Association. Three references are required.

Course of Study

The total number of credit hours required in the existing BSc (Physiotherapy) degree is 138. Students with a Diploma in Physiotherapy are allowed a total of 78 credit hours, and must therefore take 60 credit hours to complete the requirements for the degree. The course of study is normally completed within 5 years from the date of initial enrollment. A break in registration is permitted but does not extend the five-year limit. A minimum overall "C" average (cumulative GPA 2.0) must be achieved.

Required Classes	Credit Hours
Elective	3
PT 4010A Applied Anatomy	3
PT 4020R Research Methods	6
PT 4030B Seminar	3
PT 4110-4140A/B Option	3
PT 4210-4240A/B Option	3
PT 3120A Exercise Physiology	3
PT 3110B Neurophysiology	3
A Statistics	3
R Elective	6
Sub total	36
Plus 4 approved Electives	24
Total	60

All students *must* obtain approval of their total proposed course of study from the School. Students who possess university classes in addition to their Diploma may apply for transfer credit. A minimum of six full classes *must* be taken at Dalhousie University. No work overload (more than 6 full courses) is permitted during an academic year. The School cannot guarantee that credits taken at another University will be equivalent to Dalhousie course offerings and therefore accepted as part of the degree requirements. See General Undergraduate Regulations—Admissions, and School regulations—Application for Admission.

Required Classes

Physiology 2030R: 6 credit hours. A full class in Physiology offered by the Department of Physiology, comprised of a lecture and laboratory series, which will be closely integrated with PT 2062R.

PT 2021A Clinical Physiotherapy I: 3 credit hours. Co-requisites: PT 2061C, PT 2062R, PT 2030R. A class in physiotherapy closely integrated with PT 2061C/PT 2062R emphasizing observation and surface anatomy in the evaluation of functional disability and the subsequent design of appropriate progressive activity.

PT 2041B Clinical Physiotherapy II: 3 credit hours. Co-requisites: PT 2061C, PT 2062R. Pre-requisite: PT 2021A. A continuation of PT 2021A with increasing emphasis being placed on the design of progressive activity in order to solve stated clinical problems involving strength, mobility, endurance and coordination.

PT 2051B Kinesiology: 3 credit hours. Co-requisites: PT 2061C, PT 2062R. The scientific basis underlying methods of evaluation, principles of progression of activity and techniques used for developing mobility, strength, endurance and coordination are considered.

PT 2061C Functional Anatomy: 3 credit hours. Knowledge of gross anatomy of the human body and associated surface anatomy is used to appreciate the relationship of anatomical structures during functional activities.

PT 2062R Gross Anatomy: 9 credit hours. The gross structure of the human body is studied region by region through the use of lectures, dissection and demonstrations in Radiological Anatomy.

PT 2070A Microbiology: 2 credit hours. Co-requisites: Physiology 2030R, PT 2061C, PT 2062R. An introductory class in Microbiology offered by the Department of Microbiology within the Faculty of Medicine.

PT 2080B Pathology: 1 credit hour. An introductory class in Pathology offered by the Department of Pathology within the Faculty of Medicine.

PT 2100B Neuroanatomy: 3 credit hours. Pre-requisite: PT 2160A. Co-requisite: PT 2061C, PT 2062R. A class in Neuroanatomy offered by the Department of Anatomy.

PT 2160A Human Histology: 3 credit hours. A histology class for physiotherapy students covering cells, tissues, and selected organs.

Summer clinical orientation: 4 weeks, 0 credit hours.

PT 3000A Assessment: 3 credit hours. Pre-requisites: PT 2021A, PT 2051B, PT 2041B. The course presents both theory and practice in the physiotherapeutic aspects of the clinical assessment of musculoskeletal disorders.

PT 3010A Clinical Therapeutics I — Orthopaedic Condition: 3 credit hours. Prerequisites: PT 2070A, PT 2080B, PT 2021A, PT 2030R, PT 2041B, PT 2051B, PT 2061C, PT 2062R, PT 2100B, PT 2160A, and four weeks clinical orientation.

PT 3020B Clinical Therapeutics III — Rheumatology/Amputees: 3 credit hours. Prerequisites: PT 2070A, PT 2080B, PT 2021A, PT 2030R, PT 2041B, PT 2051B, PT 2061C, PT 2062R, PT 2100B, PT 2160A, and four weeks clinical orientation.

PT 3030B Clinical Therapeutics IV — Neurological Conditions: 3 credit hours. Pre-requisites: PT 2070A, PT 2080B, PT 2021A, PT 2030R, PT 2041B, PT 2051B, PT 2061C, PT 2062R, PT 2100B, PT 2160A, and four week clinical orientation.

PT 3050A Clinical Therapeutics II — Cardiorespiratory/Obstetrics: 3 credit hours. Prerequisites: PT 2070A, PT 2080B, PT 2021A, PT 2030R, PT 2041B, PT 2051B, PT 2061C, PT 2062R, PT 2100B, PT 2160A, and four weeks clinical orientation.

Classes designated as Clinical Therapeutics I, II, III, IV, include lectures from the teaching staff of the Departments of Medicine, Surgery, Paediatrics, Neurosurgery, Obstetrics and Gynecology of the Faculty of Medicine, and these are integrated with the Physiotherapeutic procedures taught by the Faculty of the School. The topics covered include conditions commonly encountered in orthopaedics, rheumatology, spinal cord injury and disease, central and peripheral nervous system lesions, medical and surgical chest conditions, vascular diseases, ante- and post-natal care together with the prevention and treatment of post-surgical complications.

PT 3060R Electrical Energy in Physiotherapy: 6 credit hours. Pre-requisites: Physiology 2030R, PT 2061C, PT 2062R. The therapeutic application and control of various forms of electrical energy are demonstrated. The physiological effects on the normal are related to the therapeutic effects used for injury and disease, these being specifically applied to a selected number of pathological conditions. The forms of energy considered include low and high frequency electricity, infrared and ultraviolet radiations, and ultrasonic energy.

PT 3110B Neurophysiology: 3 credit hours. Prerequisite: Physiology 2030R. The principles of neurophysiology and survey of current concepts of the organization and function of the mammalian nervous system are provided.

PT 3120A Exercise Physiology: 3 credit hours. Prerequisite: Physiology 2030R. The student is given a thorough understanding of skeletal muscle physiology and insight into the short and long term response to work. The material is related to normal and pathological conditions.

PT 3500B Clinical Practicum: 0 credit hours. Summer clinical practicum, Year III/IV. *In addition, students must take Psychology 2120B (Clinical Psychology) during the third year of study.*

PT 4010A Applied Anatomy: 3 credit hours. Pre-requisites: PT 2061C and PT 2062R or equivalent. An advanced class in Functional Anatomy with particular emphasis on human movements.

PT 4020R Research Methods: 6 credit hours. Pre-requisite or co-requisite: An approved course in statistics. The student acquires a scientific approach to the study of a problem and appreciate the need, value and fundamentals of physical therapy research.

PT 4030B Seminar: 3 credit hours. Presentations by faculty, other resource persons and students are given on issues related to the health care delivery system and administration in Physiotherapy.

PT 4110-4140A/B Option: 3 credit hours.

PT 4030B Seminar: 3 credit hours. Each student takes one option class in each term. These classes are related to detailed study of specific areas in Physiotherapy or related fields, some of which offer the opportunity to develop advanced clinical skills. Final details of options are available to the students at the beginning of each academic year.

PT 4050B Psychiatry: 3 credit hours. Prerequisite: Clinical Psychology 2120B. An understanding of common psychiatric disorders that students will meet in clinical practice is developed. The class is given by members of the Department of Psychiatry in the Faculty of Medicine.

PT 4060R Clinical Practice: 6 credit hours. Prerequisite: PT 3500B. All students must undertake up to 15 hours per week in the practice of Physiotherapy in an approved setting. Satisfactory clinical performance is mandatory prior to graduation. *In addition, students are required to take Math 1060A (Statistics) during the fourth year of study.*

Elective Classes

PT 3070A/3080B Directed Study: 3 credit hours each. Under the guidance of a member of Faculty of the School of Physiotherapy a student may undertake a detailed study related to the theory or practice of Physiotherapy or associated topics. A variety of subjects ranging from detailed literature surveys to more clinically oriented areas are available to the students and evaluation is based upon the collection and presentation of the material.

PT 3090B/N4800B/Ph4950B/HE2250B Interdisciplinary Course in Human Nutrition: 3 credit hours, normally spring term, E. Lambie. Prerequisite: Biology 1000 or at the discretion of the professor. For class description, see N4800B.

PT 4300A/4901B/N4900A/4910B/OT4417A/4418B/PE, HE, REC 4498A/ 4499B/PH4960A/4970B An Interdisciplinary Approach to Gerontology: See N 4900A and N 4910B for description.

School of Recreation, Physical & Health Education

Academic Staff

Robert S. Tonks, BPharm, PhD (Wales), FPS, FI Biol *Dean of the Faculty of Health Professions*

T.L. Maloney, BPE, BEd (University of Alberta), MA (University of Western Ontario) PhD (University of Alberta), *Director and Associate Professor.*

Professors

E.G. Belzer Jr., BS (West Chester State College), MS (University of Maryland), PhD (University of Illinois),

A. Bonen, BA (University of Western Ontario), MS, PhD (University of Illinois) *Head of the Physical Education and Kinesiology Division and Supervisor of Human Performance Laboratory*

L.E. Holt, BS, MS (Springfield College) PhD (University of Southern Illinois)

J.C. Pooley, Teach. Cert. (Bede College, England), Dip. PE (Carnegie School of Physical Education, England), MS, PhD (University of Wisconsin)

A.J. Young, BS (West Chester State College), MS, PhD (University of Maryland)

Associate Professors

R.P. Beazley, BA, BEd (Acadia University), BPE (McMaster University), MPE (Dalhousie University), EdD (University of Tennessee), *Head of the Health Education Division*

J.F. McCabe, BPE, BA (University of New Brunswick), MSc, EdD (University of Tennessee), *Supervisor of Motor Skills Research Laboratory*

A. Richards, Dip. PE (Carnegie School of Physical Education, England), Teach. Cert. (Trent Park College), MSc (Dalhousie University), EdD (University of Colorado)

Assistant Professors

L.J. Barnes, BPE, MSc (Dalhousie University)

P.D. Campagna, BPHE (University of Windsor), BEd (Queen's University), MEd (State University of New York), PhD (University of Alberta)

G.C.B. Elder, Dip.Ed.Adv. (St. Mary's College, University of London), MEd (Georgia Southern University), PhD (McMaster University)

R.J. Hoyle, BA, MA (Cambridge University), MSc (Dalhousie University)

N.M. Ipson, BA, MS (Brigham Young University), *Supervisor, Campus Recreation Programs*

N.H. Kemp, DLC (Loughborough College, England), BS (PE), MS (University of Oregon)

R.F. Lyons, BA (Dalhousie University), MEd (Xavier University), PhD (University of Oregon), *Head of the Leisure Studies Division*

W.R. Mitic, BA (University of Western Ontario), MHK (University of Windsor), EdD (State University of New York)

J. Prsala, MA, PhD (Charles University, Czechoslovakia)

C.A. Putnam, BPE (University of Manitoba), MS (University of Washington), PhD (University of Iowa), *Supervisor of Biomechanics Laboratory*

P.D. Richards, Teach. Cert. (Trent Park College), Laban Arts of Movement Centre Certificate (England), MA (University of Colorado)

S.M. Shaw, Cert. Ed. (Institute of Education, University of London), BPE, MSc (Dalhousie University), PhD (Carleton University)

C.A. Savoy, BPE (University of New Brunswick), EdM (Boston University)

J.F. Singleton, BA (University of Waterloo), MS (Pennsylvania State University), PhD (University of Maryland)

L.J. Verabioff, BA BPHE (Queen's University), MS (University of Michigan), PhD (Ohio State University), *Supervisor of Internship Programs*

A.D. Yarr, BPE, MPE (University of British Columbia)

Lecturers

H.C. Ballem, BPE (University of New Brunswick), MSc (Dalhousie University)

A.D. Bellemare, BPE (University of New Brunswick), MSc (Dalhousie University)

L.A. MacGregor, BPE (Dalhousie University), MS (University of Illinois)

D.P. McGuire, BA (Wright State University), MA (University of Cincinnati)

J.A. Scott, BPE (University of Calgary), MS (University of Oregon)

Special Lecturers

R.L. Kirby, MD (Dalhousie University), FRCP(C)

J.F. MacDougall, BA, BEd (St. Francis Xavier University), Dip. Physical and Health Education (Dalhousie University), MEd (Ontario Institute for Studies in Education)

d. Neumann, BA (University of Toronto), MA (York University)

H.A. Nobel, BSc (Springfield College), AIE (University of London), DPE (Acadia University), LLD (Dalhousie University)

R.E. Stalker, MD (Dalhousie University), *Dalhousie University Student Health Services*

Purposes of the School

Since its inception in 1966 the School of Recreation, Physical and Health Education has been assigned responsibilities for undergraduate studies in the Divisions of Health Education, Physical Education and Kinesiology, Leisure Studies, and for the conduct of graduate education and research.

Information about the graduate programs available in Physical Education, and Kinesiology, Health Education and Leisure Studies is available in the Calendar of the Faculty of Graduate Studies.

Regulations

1. All students must observe the University and Faculty regulations described in this Calendar.

2. All students must attend the classes of their prescribed course regularly and punctually. When the work of a student becomes unsatisfactory or attendance is irregular, the student may be required to discontinue the class concerned.

3. Undergraduate Grade Point Average Standards

First Year of Study: A student must obtain a minimum grade point average (GPA) of 1.8 by the end of the first year of university study in order to enroll in further study in the School. (For purposes of this policy, the end of the first year of university study is defined as the end of the regular academic year in which the student first accumulates 30 or more registered credit hours.)

Second and Third Years: A student must obtain a minimum annual GPA of 2.0 during the second and third years and a minimum cumulative GPA of 2.0 by the end of the second and third year of university study in order to enroll in further study in the School. (For purposes of this policy, the end of the second and third year of university study is defined as the end of the regular academic year in which the student first accumulates 60 and 90 or more registered credit hours respectively.)

Degree Requirements: A student must obtain a GPA of 2.0 in the final year of university study and a minimum cumulative GPA of 2.0 over the entire undergraduate course of study in order to be awarded the BPE degree, BRec degree, or BSc (Health Education) degree.

4. Computation of Grade Point Average

The point value of letter grades and their use in GPA calculation are explained in Health Professions Regulation 2.1. The significance of letter grades is explained in University Undergraduate Regulation 19.3.

Notes:

A "W" (withdrawal failure), "INC" (incomplete) and "NP" (no paper) will be counted as an "F" for computation purposes.

A grade of "FM" continues to be counted as zero grade points in computing the GPA unless a supplemental examination is written and passed, in which case a value of 1.0 is assigned.

The grades of "F," "W" and "NP" are not deleted from a student's record nor from GPA computations even if the class is repeated and passed.

A grade of "ILL" may only be awarded if a medical certificate has been submitted. A class so graded must be completed at the earliest possible opportunity. A grade of "ILL" does not enter into the GPA computations.

5. Retirement from the School

Any student who has been declared as not having met the GPA standards for the first time is allowed a probationary period until August 30. During this probationary period Summer School classes may be taken at Dalhousie and if the grades achieved in such courses raise the GPA to the minimum required level, the student is readmitted. In cases where the GPA is too low to be raised by taking a normal Summer session workload the student is retired from the School with no probationary period.

If the grades achieved in Summer School are not sufficient to raise the GPA, the student is retired from the School for a period of at least one academic year. Application may be made to be readmitted for the following academic year (i.e., one year after retirement from the School). The application is processed through normal procedures only if the student's GPA has been raised to the minimal level. Readmission at this time is contingent upon one of two things: (1) the remainder of the student's program can be completed in the period specified for degree completion in the Faculty Regulations, or (2) the Committees on Studies of the School and the Faculty of Health Professions find justification for extending the period for degree completion.

6. Failure to Attain GPA Standards

Any student who fails to meet the yearly GPA standards as defined in Regulation 3 above must withdraw from the School. Provisions for being readmitted are provided in Regulation 5 above. However, a student who has been declared as having failed the year on any two occasions is not eligible to return to the School.

7. Academic Appeals Procedures

7.1 Appeals to Division Committee on Studies: In each of the divisions in the School of Recreation, Physical and Health Education (Health Education, Physical Education and Kinesiology, Leisure Studies) a Committee on Studies exists for the purpose of hearing initial student appeals of academic decisions.

The student appellant is responsible for the preparation of all documentation in support of his/her appeal.

The student must submit the appeal to the appropriate division head who will convene a meeting of the Committee on Studies.

The student has the right to appear before the Committee on Studies and he/she should notify the division head of his/her desire to do so. The student also has the right to be represented by an advocate of his/her choice.

The decision of the divisional Committee on Studies shall be conveyed to the student, in writing, by the division head immediately after the conclusion

of the appeal. This notification should include information about procedures to appeal to the School's Committee on Studies.

If the student's appeal is denied, the student may appeal to the School's Committee on Studies by the procedures identified below. This appeal must be presented to the School's Director within 30 days of notification from the division head of the result of the appeal at the division level.

If the student's appeal is upheld two things may happen:

In the case of division regulations, the matter need go no further and implementation is carried out by the division head.

In the case of the School/Faculty regulations, the division head is responsible for presenting the case to the Committee on Studies of the School of Recreation, Physical and Health Education

7.2 Appeals to the Committee on Studies of the School of Recreation, Physical and Health Education: As noted above it is the responsibility of the student to forward the necessary documentation to the School's Committee on Studies when the appeal is initiated by the student. Otherwise, it is the responsibility of the division head.

As the Chairman of the School's Committee on Studies, the Director will inform the student of his/her right to appear before the Committee. The student will also be informed of his/her right to be represented by an advocate of his/her choice.

The decision of the School's Committee on Studies shall be conveyed in writing to the student by the Director immediately after the conclusion of the appeal. If the student's appeal is denied this notification shall include information about procedures to appeal to the Committee on Studies of the Faculty of Health Professions. It should be noted that this appeal to the Faculty of Health Professions Committee on Studies must be presented within 30 days of notification from the School of the disputed academic decision.

If the student's appeal is supported, three things may happen:

In the case of School regulations, the matter need go no further and implementation is carried out by the Director of the School.

In the case of Faculty of Health Professions regulations, the Director of the School is responsible for presenting the case to the Committee on Studies of the Faculty of Health Professions.

In the case of the Faculty of Graduate Studies regulations the Director of the School is responsible for presenting the case to the Dean, Faculty of Graduate Studies for appropriate processing.

Degree with Distinction

The Degree of Bachelor of Physical Education, Bachelor of Recreation or Bachelor of Science (Health Education), with Distinction is awarded under circumstances of Faculty Regulation 2.5.

Student Advisory Programs

Although many courses are compulsory in the School's program, considerable latitude exists for the development and extension of individual interests. To help in planning a total personal program each student is assigned an adviser from the teaching staff. Advisers can help students to select courses, avoid common pitfalls, choose activities, interpret regulations, and solve various types of problems. Although students are responsible for their own programs and for maintaining high academic standards, they should consult with their advisor regularly and whenever problems may occur.

Student Exchange Program

A reciprocal exchange program operates between the School and several colleges of Physical Education in England and the United States. Students of good academic ability may apply to participate in this study opportunity in their second or third year.

Courses of Study for a Bachelor of Physical Education

One of the responsibilities of the School is to provide optimal conditions for the theoretical and practical study of human movement in its varying forms. A variety of research and study topics can be pursued.

The combined BPE/BEEd program prepares students for a teaching career. In the BPE (Human Movement Studies) program the student has the opportunity to:

- (a) take a general four year degree in a life science discipline;
- (b) specialize and relate sport and physical activity to another academic discipline, e.g., psychology, physiology, biomechanics;
- (c) develop an applied specialization, e.g., physical fitness assessment, coaching, dance.

General Education

Studies in the general education area occupy about one-third of the total curriculum and have three overlapping purposes. The first is to contribute to a liberal education. The second purpose is to provide background studies of specific importance to Physical Education and Kinesiology. The third is to provide for deeper study in another academic discipline. This choice will depend upon the student's interest, although, if a general school teaching qualification is desired, the student must choose a subject being taught in the school system in which he/she plans to teach. Students must complete at least 3 credits in the minor subject, 2 of which must be beyond the 1000 level.

Theory

The theory courses are intended to provide a foundation for understanding the administrative, historical, mensural, philosophical and scientific aspects of Physical Education and Kinesiology.

Activity

The role of activity modules is three-fold:

- (a) To develop fitness specific to the activity;
- (b) To develop skill;
- (c) To develop theoretical knowledge and understanding of the technical aspects of the activity.

Admission Requirements for BPE Degree

The requirements for entrance into the BPE program are generally the same as those outlined for other Health Professions. See the admissions section of this calendar. In addition, a senior class in physical education may be considered for admission to the BPE program.

The admission requirements outlined represent the minimum standard and final selection rests with the School. It is highly recommended that students seek a sound science and mathematics background prior to entering the program. In order to complete application for admission, it is necessary to have three letters of reference indicating professional and academic suitability forwarded directly by the referees to the Head, Physical Education and Kinesiology Division at the School of Recreation, Physical and Health Education.

Admission With Advanced Standing

Students may be admitted to the undergraduate program with advanced standing if they have completed arts and science classes in Dalhousie or in a recognized university. However, all graduation requirements of the School ultimately must be met.

Students who have completed the three year Associate of the Nova Scotia Teachers' College, Truro, may be admitted with advanced standing, provided they satisfy the usual admission requirements for the Bachelor's Degree in Physical Education at Dalhousie. The decision on granting credit depends on whether an acceptable level of accomplishment has already been demonstrated in a comparable course.

Field Experiences

A compulsory program of field experience is offered in each of the last four years of the combined BPE/BEEd program. These experiences will include observation and involvement in school or community programs. Students who intend to gain teacher certification must complete the practice teaching experience successfully.

Four Year Bachelor of Physical Education Program (Human Movement Studies)

First Year	Credit Hours
PE Theory	
PE 1104	3
PE 2230	3
Anatomy 102	3
Physiology 102	3
Psychology 1000 or 1010	6
Electives ¹	12
Total	30

Second Year	Credit Hours
PE Theory	
PE 2110	3
PE 2220	3
PE Electives	6
Electives ¹	12
Open Options	6
Total	30

Third Year	Credit Hours
PE Theory	
PE 3310	3
PE 3320	3
PE 3330	3
PE Elective	3
Electives ¹	12
Open Options	6
Total	30

Fourth Year	Credit Hours
PE Theory	
PE 4465	3
PE 4490	3
PE 4497	3
PE 4800 Series	3 or 6
PE Electives	3 or 6
Electives ¹	12
Total	30

¹ Electives may be chosen from the Faculties of Arts and Science, Health Professions (excluding PE and Recreation courses), Management Studies and Medicine. Biology 1000 is strongly recommended.

Students taking a minor in Health Education do part of their practice teaching in Health Education if such school programs are available. If a student is interested in special programs such as remedial Physical Education or outdoor education, every effort will be made to provide a relevant field experience.

Students must provide their own transportation for their field work.

Health Education Minor (24 Credit Hours)

The Health Education Division of the School of Recreation, Physical and Health Education offers a minor program in Health Education for students whose major area of study is Physical Education. Consult the School for details of the Health Education minor.

Five Year Combined Bachelor of Physical Education/Bachelor of Education Program

Students are expected to choose a minor in a teachable subject, e.g., English, French or other language, history, mathematics, biology, chemistry, physics, economics, health education. They must complete 18 credit hours in the minor subject, 12 credit hours beyond the 100/1000 level.

Students are required to take a program of physical activity as designated by the School. This will not exceed 6 hours per week.

First Year	Credit Hours
PE Theory	
PE 1104	3
PE 1195	3
PE 2110	3
PE 2230	3
Anatomy 102	3
Physiology 102	3
Psychology 1000 or 1010	6
Electives ^{1 2}	6
Total	30

Second Year	Credit Hours
PE Theory	
PE 2220	3
PE 2295	3
PE 3310	3
PE 3384	3
Education Foundations	
Sociology/History/Philosophy	3
Education Psychology 4311A or 4312B	3
Electives ¹	12
Total	30

Third Year	Credit Hours
PE Theory	
PE 3320	3
PE 3330	3
PE 3382	3
PE 3395	3
PE 4465	3
Education Philosophy	3
Education Psychology	3
Electives ¹	9
Total	30

Fourth Year	Credit Hours
PE Theory	
PE 2250	3
PE 3398 ²	3
PE 4497	3
PE Elective	3
Education Foundations	
Sociology/History/Philosophy	3
Education 4900	3
Electives ¹	12
Total	30

Fifth Year	Credit Hours
PE Theory	
PE 4490	3
PE 4495 ³	12
PE Electives	9
Education Foundations Elective	3
Education 4900	3
Total	30

¹ Electives may be chosen from the Faculties of Arts and Science, Health Professions (excluding PE and Recreation courses), Management Studies and Medicine. Biology 1000 is strongly recommended.

² Includes three weeks of teaching internship in the Halifax Metro area at the end of the Spring term.

³ PE 4495 students are assigned to schools in the Metro area as of September 1 or whenever school begins, until November 30. Students are in schools from 8:30 a.m. to 12:00 Noon T, W, R, and F with seminars held Monday mornings. No other classes may be scheduled for these times.

Courses of Instruction**BPE (Human Movement Studies) and BPE/BEd Programs**

A. Activity Program: The activity program is a series of short courses, some of which are to be completed as a requirement of graduation from the BPE/BEd program (as well as the BRec program described later in this calendar). A variety of activities is offered to allow both a concentration in a few areas and the opportunity to be diverse. This specialization and diversity help students meet the needs of hiring agencies such as school boards and municipal recreation departments. Students' performances are evaluated on a Pass/Fail basis. The BPE/BEd and BRec programs have separate activity requirements reflecting the professional natures of the programs. The activity program is open to students in the BPE (Human Movement Studies) program but is not a requirement.

B. Theory Classes:

Anatomy 102C Basic Human Anatomy: lecture and lab 3 credit hours, fall and spring terms. Taught within the Department of Anatomy in the Faculty of Medicine with emphasis on gross anatomy. Scope and sequence are coordinated with Physiology 102C, which is taken concurrently.

Physiology 102C Basic Human Physiology: lecture and lab 3 credit hours, fall and spring terms. Taught within the Faculty of Medicine's Department of Physiology, designed for Physical Education and integrated with Anatomy 102C. Examinations in Physiology 102C are written with those in Anatomy 102C. Separate grades are awarded.

PE 1104 Cultural Foundations of Physical Activity: lecture 3 credit hours, normally fall term. An introduction to the scientific disciplines forming the historico-cultural foundations of physical activity, designed to answer the range of questions which necessarily arise in teaching students with a wide variety of backgrounds.

REC/PE 1126 Introduction to Recreation: lecture 3 credit hours, normally fall term. For class description please refer to the BRec section of this calendar.

PE 1195 Introduction to Teaching: lecture 3 credit hours, normally fall term. Examines the profession of teaching with emphasis on the area of Physical Education. Purposes of education, teacher roles and a brief introduction to the teaching process are included.

PE/REC 2110B History of Physical Education, Sport and Recreation: lecture 3 credit hours, normally spring term. The development of Physical Education from ancient times to twentieth-century Canada is introduced.

PE 2220 Measurement and Evaluation in Physical Education and Health Education: lecture and lab 3 credit hours, normally fall term. An introduction to the fundamentals involved in measurement and evaluation, including writing objectives, designing and administering tests, organizing and analyzing test results. Tests used to measure physical fitness, specific motor skills and health knowledge are investigated.

PE/HE/REC 2230 Human Growth and Development: lecture and lab 3 credit hours, normally spring term. A study of factors influencing human growth and development from birth to maturity, as revealed by observational and experimental studies.

PE 2250 Organization and Administration of Physical Education and Recreation: lecture 3 credit hours, normally spring term. This course focuses on the administrative and planning processes involved in the development and implementation of recreation and leisure programs in both community and public school settings. Students will have the opportunity to apply and test programming principles through practical experience in organizing a recreation program in settings internal or external to the University.

PE 2295 Instructional Techniques in Physical Education: lecture and field work 3 credit hours, normally spring term. Prerequisite: PE 1195. A continuation of work begun in PE 1195 with emphasis on instructional techniques. Class management and planning will be areas of major concentration. The course includes theoretical content as well as appropriate field work related to teaching.

PE 3157 History of Dance: lecture 3 credit hours, normally spring term. For course description please consult the School.

PE 3310A Physiology of Exercise: lecture and lab 3 credit hours, normally fall term. Prerequisite: Anatomy 102 and Physiology 102. This is an introductory course for students with a basic knowledge of anatomy and physiology. It concentrates on the respiratory, cardiovascular and neuromuscular systems in terms of their involvement during exercise, their adaptation to different types of training and how they limit performance during exercise in different environmental conditions.

PE 3320 Applied Anatomy and Kinesiology: lecture and lab 3 credit hours, normally fall term. Prerequisite: Anatomy 102 and Physiology 102. Emphasis is on application of anatomical and kinesiological information to teaching and coaching experiences. The first half semester involves those bodily systems which produce movement, with emphasis on neuroanatomy. The second half semester consists of application of kinesiological principles so that activities can be interpreted effectively.

PE 3330 Motor Skill Learning and Performance: lecture and lab 3 credit hours, normally spring term. Prerequisite: Psychology 1000. Motor skill learning and performance deals with how we become efficient in completing movements to achieve a desired goal. It involves systematic changes in our perception of the environment, how we make decisions about what movements to make, as well as changes in how these movements are carried out. This class covers what we know about these processes as well as how this information can be applied.

RE/REC 3382/Education 4642 Principles of Outdoor Education: 3 credit hours, normally spring term. Taking the classroom out of doors, and the possibilities of introducing various activities which such a concept would encompass are studied through discussion of various relevant issues. The place of outdoor education in Nova Scotia is considered.

PE 3384 Leisure and Disabled Persons: lecture 3 credit hours, normally spring term. An introductory overview of current practices, philosophies and issues related to physical activity for the disabled. The class emphasizes knowledge and understanding of various disabling conditions in relation to physical activity.

PE 3395 Curriculum Planning and Development: lecture 3 credit hours, normally fall term. Prerequisites: PE 1195 and PE 2295 or permission of the instructor. An introduction to basic curriculum theory and program development principles. Developing a curriculum philosophy, objectives, course and unit plan and program evaluation are covered. Appropriate field work is included.

PE 3398 Practical Studies: lecture/lab/field work 3 credit hours, normally spring term. Prerequisite: PE 3395. Students completing this class will have practised basic teaching skills for teaching team, individual, dual and fitness activities. Analysis of teacher behaviour and practice in using a variety of teaching styles receive emphasis. Three weeks of full-time student teaching are included at the end of the term.

PE 4402 Elementary Physical Education Specialization: lecture/lab 3 credit hours, normally fall term. Prerequisite: PE 4445. This course is designed for students who wish to specialize in elementary physical education. Special projects with young children are developed by the class. Course includes field trips to innovative school, preschool and community organization programs.

PE 4410 Care and Prevention of Athletic Injuries: lecture/lab 3 credit hours, normally spring term. The course offers a fundamental understanding of the maintenance of health (personal hygiene, nutrition, prevention of common ailments and injuries). More specifically it will deal with first aid, sports injuries, their prevention and treatment. Students will acquire practical skills in taping techniques and cardio-pulmonary resuscitation.

PE 4414 Physical Fitness Assessment and Program Design: lecture and lab 3 credit hours, normally fall term. Prerequisite: PE 3310. (Alternates with PE 4419.) Evaluation of various methods of physical fitness assessment, designing fitness programs for diverse populations and identifying motivational techniques with emphasis on the areas of cardiovascular fitness, weight reduction, pre- and post-natal programs and the elderly. In addition, laboratory work teaches the techniques of administering various fitness tests.

PE 4419 Physiological Bases of Sport Training and Performance: lecture and lab 3 credit hours, normally spring term. Prerequisite: PE 3310. (Alternates with PE 4414.) Human physiological adaptations to varying levels of exercise are studied. The conceptualization of the physiologic principles operating as the body's oxygen transport system adapts to meet metabolic demands of the working muscles provides the major emphasis. Attention is given to the metabolic, circulatory and pulmonary adjustments to the working state with a section devoted to the problems of acid-base homeostasis during exercise.

REC/PE 4420 Leisure Facilitation — Physical Disabilities: lecture, lab and field work 3 credit hours, normally fall term. Prerequisite: PE 3384 or REC 2384. For class description please refer to the BRec section of this calendar.

REC/PE 4426 Leisure; Facilitation — Cognitive and Psychiatric Conditions: lecture, lab and field work 3 credit hours, normally spring term. Prerequisite: PE 3384 or REC 2384. For class description please refer to the BRec section of this calendar.

PE/HE 4440 Seminar — Research Interpretation and Undergraduate Paper: lecture/discussion with lab to be arranged 3 credit hours, normally fall term. For those who plan to pursue graduate studies, the application of the processes of science to the field are discussed in a series of lectures to introduce the student to the language and methods of science in general. The assignments lead to the proposing and conducting of a small investigation appropriate to student interests, which is written in the format of a journal appropriate to the question addressed. Selected studies are presented to the class.

PE 4445 Movement for Young Children: lecture and lab 3 credit hours, normally fall term. The course deals with the theoretical and practical aspects of movement education in the elementary physical education curriculum. Current movement theories are discussed and applied to the areas of gymnastics, games and dance for young children. Integration with other subject areas in the school curriculum is also a major topic in the course.

PE 4465 Biomechanical Analysis: lecture and lab 3 credit hours, normally spring term. Prerequisite: PE 3320. The focus of the course is on human movement analysis. The course is designed for the practitioner who eventually will teach and/or coach physical activity. At the same time the course will provide a solid base for those students wishing to pursue the study of Biomechanics in greater depth.

REC 4467 Modern World Tourism: lecture 3 credit hours, normally fall term. For class descriptions please refer to the BRec section of this calendar.

PE 4470 Comparative Physical Education and Sport: lecture and discussion 3 credit hours, normally fall term. The attitudes, values, interests and habits with regard to sport and physical well-being of people in various countries are examined, and an understanding of such characteristics within socio-economic and politico-religious developments of those countries is sought, to attempt generalization and draw inferences for future developments in Canada.

PE 4476 Skilled Performance: lecture 3 credit hours, normally fall term. Prerequisite: PE 3330B. Primarily concerned with examining the main concepts of skilled performance; that is, those factors which appear to be related to the effective and efficient acquisition of pre-determined goals on a regular basis. For the most part this class uses an information processing focus to study motor skills and the potential influences on their performance. However, one consequence of the material should be the recognition that any attempts to isolate skilled behavior into separate perceptual, cognitive and motor skills can occur only at a superficial level. In addition, an attempt is made to use appropriate examples from sport, industrial and clinical settings to illustrate particular concepts.

PE/HE 4480 Research Statistics and Experimental Design Techniques: lecture and lab 3 credit hours, normally fall term. Experiences in analyzing data and constructing experiments are provided.

PE/REC 4482C Outdoor Education Specialization: lecture and lab 3 credit hours, fall and spring terms. Prerequisite: PE/REC 3382 and/or permission of instructor. Designed for students who wish to specialize in outdoor, adventure-based experiential education. There is an opportunity to develop practical leadership skills in an outdoor lab at the Freshmen Base Camp. Other labs are required during the year, including such expeditions as rock climbing, canoeing, skiing, winter survival, etc. There is considerable time spent on the study of the literature related to the field of experiential education and current issues in the field are discussed during weekly seminars.

PE 4485 Socio-Psychological Aspects of Physical Education: lecture and seminar 3 credit hours, normally spring term. An introduction to several psychological and sociological concepts with implications for Physical Education which are relevant to different aspects of students and society.

PE 4490 Sociology of Sport and Recreation: lecture and discussion 3 credit hours, normally spring term. Prerequisite: Sociology 1200 is recommended. The historical antecedents of sports and physical education affecting Canadian life.

PE 4494 History of Physical Education and Recreation in Canada: lecture and independent study 3 credit hours, normally spring term. The historical antecedents of sports and Physical Education affecting Canadian life.

PE 4495 Teaching Internship in Physical Education: seminar and field work 9 credit hours, normally fall term. Prerequisite: PE 3398. Further investigation of principles of effective teaching as they relate to physical education is combined with practice teaching in rural and urban schools in preparation for a professional career.

PE 4497 Philosophy for Physical Educators: lecture 3 credit hours, normally spring term. Prerequisites in Philosophy are not essential. An introduction to "thinking with concepts" provides a foundation for choice analysis in a seminar presentation. An introduction to existentialism is presented, with emphasis on choice, freedom and responsibility.

PE 4800A, B, C, S or T Directed Studies in Physical Education: lecture 3 credit hours, either fall and/or spring terms. Prerequisites: Fourth year status; a GPA of at least 2.8; a 'B' grade in an earlier class in that area (where appropriate); consent of advisor; consent of faculty. Senior undergraduate students develop an area of specialization under the direction of a faculty member by completing a library, laboratory, survey or other research study.

PE 4498A/4499B An Interdisciplinary Approach to Gerontology: See N 4900A/4910B for description.

Course of Study for Bachelor of Recreation

Program Description

In the Fall of 1977 the Senate conferred full degree status on the Recreation program at Dalhousie University. The Bachelor of Recreation program has four main purposes:

1. to meet growing interest in recreation and leisure with emphasis on the study of leisure behaviour, recreation administration and the analysis of leisure service delivery.
2. to provide professional education for planning and administering recreation programs in an increasingly complex environment and in services for special populations;
3. to identify study concentrations in recreation and leisure to a competency in specialized areas and graduate study. In this context five concentrations have been identified: Recreation Administration, Leisure and Special Populations, Outdoor Recreation, Leisure Studies and Cultural Activities.
4. to emphasize relationships between recreationalists and others involved in the human service delivery system.

Admission Requirements and Regulations

1. All students must observe the University and Faculty regulations described in this calendar.
2. The requirements for entrance into the Bachelor of Recreation program are generally the same as those outlined for other Health Professions. See the admissions section of this calendar.

The admission requirements outlined represent the minimum standard and final selection rests with the School. In order to complete application for admission, one must have three letters of reference indicating personal and academic suitability and the Experience Background Questionnaire forwarded directly by the referees to the Head of the Leisure Studies Division at the School.

Four Year Bachelor of Recreation Program

First Year	Credit Hours
REC Theory required	
REC/PE 1126A	3
REC 1260B	3
Psychology 1000R	6
Sociology 1200R or 1000R	6
Theatre 100R or Music 1000R	6
Electives	6
(Introductory Level)	
Activity Modules (6)	
Total	30

Note: Students may elect a study concentration at the beginning of second year.

Second Year	Credit Hours
REC Theory Required	
PE/REC 2110B	3
REC 2127A	3
PE/HE/REC 2230B	3
REC 2326A	3
REC 2296B	3
REC 2384A	3
Electives ²³	12
Activity Modules (6)	
Total	30

Third Year	Credit Hours
REC Theory Required	
REC 3360A	3
REC 3361B	3
REC 3382B	3
REC Electives	9
HE/REC 3350B	
HE/REC 3351B	
REC 3362B	
REC 3363B	
REC/PE 4420A	
Electives ²³	12
Activity Modules (6)	
Total	30

Fourth Year	Credit Hours
REC Theory Required	
REC 4450B	3
REC 4481A	3
REC 4496R	6
REC Electives	9
REC 4426B	
REC 4467A	
PE/REC 4482C	
REC 4491B	
REC 4492A	
Electives ²³	9
Activities (6)	
Total	30

1. It is recommended that new students include Base Camp module in their first-year program. A minimum of 24 activity modules required for degree completion.

2. Electives may be chosen from the Faculties of Arts and Science, Health Professions and Management Studies, and must be beyond the introductory level unless otherwise stated.

3. A maximum of 12 credit hours of electives may be chosen from the PE options.

Courses of Instruction — BREC Program

A Activity Program

Please refer to the Bachelor of Physical Education section of this calendar.

B. Recreation Theory Courses

REC/PE 1126A Introduction to Recreation lecture 3 credit hours Normally Fall term. An exploration of the philosophy of recreation in Canada, examining the physical, financial and human resources needed for the total population. The organization and administration of the leisure industry provides insights about delivering recreational systems to the public. Also of concern is the broad spectrum of recreation and the many different agencies which deliver it, in both the public and private sectors of the leisure industry.

REC 1260B Program Development: lecture and practical experience 3 credit hours, normally spring term. The development and implementation of recreation and leisure programs in a number of direct service agencies are examined. Students can test and apply recreation and leisure service program principles through practical experiences. Each student organizes recreation programs in settings internal and external to the University.

PE/REC 2110B History of Physical Education, Sport and Recreation: lecture 3 credit hours, normally spring term. For class description please refer to the BPE section of this calendar.

REC 2127A Concepts of Leisure: lecture 3 credit hours, normally fall term. Prerequisite Sociology 1200. This class provides an introductory analysis of leisure in modern society from sociological and social psychological perspectives. The course focuses on the relationships between leisure and various components of Canadian society including work, the political-economic system, the family, culture and modern technology.

PE/HE/REC 2230B Human Growth and Development: lecture and lab 3 credit hours, normally spring term. For class description, please consult the BPE section of this calendar.

REC 2296B Leadership, Group Process and Community Development: lecture 3 credit hours, normally spring term. With the development of the recreation movement in the 20th Century the recreation professional has been concerned with helping Canadians to use their free time. To be an effective recreational leader a student must know and understand those components which help a group or an individual develop full potential. The science of communications is applied to the relationship of the recreation professional to individuals and groups in the community. An in-depth analysis of situational leadership theory and small group processes are integral parts of this class.

REC 2326A Art and Leisure: lecture 3 credit hours, normally fall term. This class focuses on the function of art education as applied to the recreation professional and his/her relationship to individuals and groups in recreation settings. It will also create an awareness of the place of creative arts in our leisure time.

HE/REC 3350B Drug Education: lecture 3 credit hours, normally spring term. For class description please consult the BSc (Health Education) section of this calendar.

HE/REC 3351B Safety Education and First Aid: lecture 3 credit hours, normally spring term. For class description please consult the BSc (Health Education) section of this calendar.

REC 2384A Leisure and Disabled Persons: lecture 3 credit hours, normally fall term. An introductory "overview" of current practices, philosophy and issues relating to the field of leisure services for the disabled. This unique aspect of leisure service demands extensive knowledge and understanding to relate disabled persons to leisure. While a semi-structured outline is followed, outside experiences provide an in-depth study of personally relevant topics.

REC 3360A The Analysis of Leisure Service Delivery Systems: lecture 3 credit hours, normally fall term. The organization and administration of leisure service delivery systems in the Atlantic Region are examined. Emphasis is placed on the inter-relationships among various agencies involved in developing services to provide the student with basic skills for analyzing and delivering these services to the public.

REC 3361B Recreation Administration: lecture 3 credit hours, normally spring term. To introduce the administrative process and various techniques used in planning and management of recreation services. Examples and problems are focused within the public sector with private and commercial operations also examined.

REC 3362B Park Management and Natural Resources: lecture 3 credit hours, normally spring term in alternate years beginning Spring 1984. Basic issues in park management and natural resource development are examined with a focus on planning and design, development and maintenance of the outdoor environment for leisure programs.

REC 3363B Arts Administration in the Community: lecture 3 credit hours, normally spring term in alternate years beginning Spring 1986. The focus of the class is to provide recreation students with the necessary knowledge, attitudes and resources involved in the effective development and coordination of community arts programs.

PE/REC 3382 Education/4642B Principles of Outdoor Education: lecture 3 credit hours, normally spring term. For class description please consult the BPE section of this calendar.

REC/PE 4420A Leisure Facilitation — Physical Disabilities: lecture lab, field work 3 credit hours, normally fall term. Prerequisite REC 2384 or PE 3384. People, their differences, their individuality, and the role of physical activity and play in their lives are examined. How one adapts physical activity to the developmental level and needs of typical and atypical children is covered. Practical field experiences allow students to apply their understandings and skills in real situations.

REC/PE 4426B Leisure Facilitation — Cognitive and Psychiatric Conditions: lecture 3 credit hours, normally spring term. Prerequisite REC 2384 or PE 3384. An advanced class providing practical knowledge and competencies in program delivery and evaluation of leisure and physical education services for individuals with disabling conditions. Topics include individualized program planning, systems analysis designs, counselling techniques, play skill development and task analysis strategies. A field placement of 30 hours is included.

REC 4450B Facility Operation, Maintenance and Management: lecture 3 credit hours, normally spring term. The concepts of facility planning, opera-

tion and management are examined with emphasis on the relationship of behaviour, use, demand, resources and ownership. Most Recreation Directors are concerned with both parks and recreation and have major responsibility to plan the effective use of facilities.

REC 4467A Modern World Tourism: lecture 3 credit hours, normally fall term in alternate years beginning Fall 1985. The links between recreation and tourism enable the recreation professional to appreciate the leisure needs of a tourist population and plan accordingly. The tourist population needs more than sun and water for a successful vacation, and recreation activities are becoming increasingly important to the visitors of our region. Many of the commercial aspects of recreation as they pertain to the tourism industry are related to the importance of tourism in the world economy.

REC 4481A Financial Management in Parks and Recreation: lecture 3 credit hours, normally fall term. Recreation service is contingent upon a dependable source of income and the willingness of public authorities to support essential services. Such financing is concerned primarily with the securing of income and its expenditures.

PE/REC 4482C Outdoor Education Specialization: lecture and lab 3 credit hours, fall and spring terms. Prerequisite PE/REC 3382 and/or permission of instructor. For class description, please consult the BPE section of this calendar.

REC 4491B/SSA 3110B Sociology of Leisure: lecture 3 credit hours. Prerequisite REC 2127A. Normally Spring term in alternate years beginning Spring 1985. This class looks at the phenomena of leisure from a sociological perspective. Emphasis is on leisure research and the application of sociological theories to the study of leisure. Topics include: the social organization of leisure, the leisure industry and the role of the state, the mass media, culture and leisure, leisure disadvantaged groups, e.g., women, the elderly, the unemployed and minority groups.

REC 4492A Leisure Education/Counselling: lecture 3 credit hours, normally fall term in alternate years beginning Fall 1984. Simply defined, leisure counselling is a helping process which facilitates interpretive, affective and/or behavioural changes in others toward the attainment of their leisure well-being. Leisure education was first used in schools in the 70's when it was recognized that the offering of physical activities did not guarantee fulfilment or leisure pursuits after graduation. This course will provide students with a basic introduction to leisure counselling and education. It will include an historical perspective, definition, philosophies, models, issues and an exposure to the use of leisure.

REC 4496R Trends and Issues in Recreation/Internship: lecture and field work 6 credit hours, spring and fall terms. The student can test and apply recreation principles through practice, broad working experience and exposure to various methods of leadership, supervisory practices and program areas. Weekly seminars are also held on current issues and trends in recreation.

REC 4498A/4499B An Interdisciplinary Approach to Gerontology: lecture See N 4900A/4910B for description.

REC 4800A, B, C, S or T Directed Studies in Recreation: lecture 3 credit hours. For description please refer to the BPE section of this calendar.

C. Required Arts and Science Courses

Sociology 1200 Introduction to Sociology: lecture 6 credit hours. For class description please refer to the Sociology and Social Anthropology Department entry in the Arts and Science section of this calendar.

Psychology 1000 Introduction to Psychology: lecture 6 credit hours. For class description please refer to the Psychology Department entry in the Arts and Science section of this calendar.

Music 1000 Man and His Music: lecture 6 credit hours, fall and spring terms. For description please refer to the Music Department entry in the Arts and Science section of this calendar.

Theatre 100R The Nature of Theatre: 6 credit hours, fall and spring terms. For class description please refer to the Theatre Department entry in the Arts and Science section of this calendar.

Course of Study for Bachelor of Science (Health Education)

Overview

The Bachelor of Science in Health Education is a four year degree program offered by the Health Education Division. The goal of health education is to promote, maintain or improve individual, family and community health through educational processes. Health educators foster personal and collective responsibility for achieving an optimal level of health, for preventing diseases and debilitating conditions from occurring, and for minimizing the impact of such diseases and conditions upon individuals who have been affected. Health educators provide a setting in which change, based on informed decisions about health matters, is promoted through education.

The responsibilities of health educators include: assessing health education needs; planning, conducting and evaluating health education programs; coordinating health education activities and resources; promoting health education throughout the community; professional development.

The BSc (HE) program guides students in attaining:

1. knowledge, attitudes and practices conducive to a healthy lifestyle,
2. professional preparation for a career in school or community health education, and
3. academic preparation for advanced study and research in health education or health-related fields.

Employment and Further Study

Graduates of the BSc (HE) program are qualified for employment with government departments, health agencies, health and fitness centres, health promotion businesses, industries, medical care centres, professional organizations, schools, senior citizens' centres, and more.

Some graduates qualify to pursue further study in fields such as business administration, education, health administration, health education, health promotion, medicine, nursing, and public relations.

Admission Requirements

Applicants should have completed Nova Scotia Grade XII (or equivalent) with an average of 70% in five university preparatory subjects, including English and biology or chemistry.

Students already engaged in university programs can transfer into the Health Education program, and experienced persons in the workplace can be admitted as mature students. Inquiries about admission to this program should be directed to the Head of the Health Education Division.

Description of the Program

The BSc in Health Education is made up of 120 credit hours of classes in four faculties — Health Professions, Arts and Science, Medicine, and Management Studies. Students must complete the following courses: Basic Human Anatomy and Physiology, Principles of General Biology, Introductory Psychology or Sociology, Microbiology, Educational Psychology, Fundamentals of Health Education, Mental Health, Human Growth and Development, Nutrition, Drug Education, Safety Education, Communicable or Chronic Degenerative Diseases, Health Education Planning and an Internship. In

addition, students complete health education electives from courses such as Consumer and Environmental Studies, Human Sexuality, Group Dynamics, Research Interpretation, Statistics and Experimental Design, Gerontology, Directed Studies in Health Education, Exercise Physiology, Physical Fitness Assessment, Sociology of the Family, Medicine and Health Across Cultures, Medical Ethics, and Methods and Materials for School Health Education.

Beyond these classes, students choose courses more specific to school or community health education. Those who prefer school health education take courses which qualify them for a Nova Scotia Teacher's Certificate (level 5), such as: History, Philosophy, and Sociology of Education; Special Education; Teaching Methods; Field Placement. These students prepare for teaching in either elementary or secondary schools. On the other hand, students who prefer community health education select one of the following two study concentrations. *Administration and Evaluation* includes courses such as Introduction to Public Administration, Accounting, Organizational Theory and Behaviour, Health Care Policy in Canada, Computer Science, Research Methods, Health Economics, and Personnel Function. *Lifestyles Education* includes courses such as Psychological Aspects of Social Issues, Exercise Physiology, Fitness Assessment, Applied Anatomy and Kinesiology, Outdoor Education, Leisure and Disabled Persons, and Interpersonal Communications.

Health Education Courses Offered

HE 1163A Biostatistics and Epidemiology: lecture 3 credit hours. Enrolment restricted to students of the School of Nursing's Diploma in Outpost and Community Health Nursing program. This course provides an understanding of epidemiology, the basic science of preventive medicine and public health. The student is introduced to such concepts as the "epidemiological method" and its application to the study of the distribution and dynamics of disease in a population. By means of a problem solving approach, the class helps to provide some of the basic tools necessary to study the occurrence of disease in order to determine such issues as the severity of an outbreak, agents of the disease, and risk factors and causation.

HE 1295R Fundamentals of Health Education: lecture/discussion 6 credit hours. Enrolment restricted to BSc (HE) students. This course is divided into five phases: three in the classroom, two in the field. In the first phase, students improve skills in library research, scholarly writing, information storage and retrieval, and public speaking. At the same time, they develop a fund of knowledge, understandings, attitudes and appreciations related to health and professional health education. In the second phase, through readings, presentations and discussions, students learn about the three aspects of the school health program: health services, the healthful environment and school health instruction. During the third phase, students become familiar with basic principles of community health education and with the role of a community health educator. Topics include needs assessment, program planning and evaluation. The final two phases are internships, each lasting two weeks. One is in a community health agency, the other in a school. These internships follow the spring examination period.

HE 2204B Consumer and Environmental Studies: lecture/discussion 3 credit hours. This class introduces students to factors which cause changes in the environment and consequently affect health. The concepts of ecology and consumerism are examined and students are expected to apply these in their personal environments. The consumer's role and responsibilities in relation to personal health status are perused.

HE 2225A Mental Health: seminar 3 credit hours. Concepts and issues of mental health are explored. Instructor and guest lecturers present related theories, research and practices. This includes information about the major

mental illnesses and their treatment. Experimental techniques are used to demonstrate the function of self-awareness and interpersonal communications in personal mental health.

PE/HE/REC 2230B Human Growth and Development: lecture 3 credit hours For class description, please consult the BPE program section of this calendar.

HE 2250B/N4800B/PH 4950B/PT 309B Interdisciplinary Course in Human Nutrition: 3 credit hours. Prerequisite: Biology 1000 or at the discretion of the professor. For class description, see Nursing 4800B.

HE/REC 3350B Drug Education: lecture 3 credit hours. International, national and regional issues of promotion, prevention, treatment and legislation of drug use are examined. Special emphasis is given to the public as drug consumer, the problematic drug user, the "Drug Industry" and teaching about drugs.

HE/REC 3351B Safety Education and First Aid: lecture/discussion/simulated practical experiences 3 credit hours. Students are introduced to the causes and effects of accidents and to strategies for reducing accidents through safety education. Upon successful completion of the first aid segments of the course students are certified in first aid and cardiopulmonary resuscitation.

HE 3395A Community Health Education Planning: seminar 3 credit hours. Issues and methods involved in the process of community health education planning are studied. Community analysis, goal and objective setting, developing education strategies and program management techniques constitute the components of planning covered in this course.

HE 4401A Communicable Diseases: lecture/discussion 3 credit hours. Prerequisite Microbiology 100A or Biology 1000R. Interactions among people, their environment, and the causal agents of communicable diseases are explored. Specific communicable diseases are examined in order to discuss the role of health education in treatment and prevention.

HE 4402A Chronic Degenerative Diseases: lecture/discussion 3 credit hours. The causes, effects and prevention of significant degenerative diseases and chronic conditions are perused. Attention is paid to the health needs of people with these conditions. The role of teachers and community workers is emphasized.

HE 4412A/B Human Sexuality: lecture/discussion 3 credit hours. This class is concerned with basic knowledge and understandings regarding biomedical, psychological, historical, legal, religious, semantic and comparative cultural aspects of human sexuality from conception to senility. Consideration is given to adjustment needs and problems of children and adults in contemporary Canadian society and to educational efforts to help with them.

HE 4425A Group Dynamics: seminar 3 credit hours. Group dynamics, including: leadership, decision making, group goals, communication, controversy, creativity, conflict, use of power, cohesion, group norms and problem solving, comprise the contents of this course. The approach to learning is experiential. The potential of students will be utilized and each one is expected to function as a teacher and helper, as well as a learner.

PE/HE 4440A Seminar — Research Interpretation and Undergraduate Paper: lecture/discussion with lab to be arranged 3 credit hours. For class description please refer to the BPE Program section of this calendar.

PE/HE 4480A Research Statistics and Experimental Design Techniques: lecture/lab 3 credit hours. For class description please refer to BPE Program section of this calendar.

HE 4494A School Health Education Planning: lecture/discussion 3 credit hours. Planning curricula for school health education is the focus of this course. Such planning includes: clarifying one's point of view about school health education, assessing content needs, structuring needed content, organizing the education program, stating goals and objectives, developing learning opportunities, assembling resources and selecting evaluation techniques.

HE 4495B Health Education Internship: field placements, seminar 15 credit hours. *Internship* — During the first 10 weeks of the course, students will intern in school or community health education settings on a full-time basis. Details about the internships are contained in the Internship Program Handbook. *Seminars* — During the concluding three weeks of the term, seminars will be conducted on campus and in community settings. They provide a forum for presenting information, sharing ideas and concerns, evaluating internships and preparing to find a job.

HE 4496A/B Methods and Materials for Elementary School Health Education: seminar 3 credit hours. If demand warrants, will be offered in the first Summer School session in alternate years with HE 4497S. Students examine and develop various health education materials designed for the elementary grades. Resource material and teaching strategies are discussed in connection with drug education, diseases, mental health, consumer health, dental health, family living, safety education, personal hygiene or other emerging topics. Emphasis is on identifying local resources.

HE 4497A/B Methods and Materials for Junior High School Health Education: seminar 3 credit hours. If demand warrants, will be offered in the first Summer School session in alternate years with HE 4496S. Students become acquainted with a range of teaching methods and procedures used in junior high school health education. Resource material is discussed and developed in topic areas such as drug education, communicable and chronic diseases, aging, mental health, consumer and environmental health, family living and human sexuality, health counselling and guidance. Emphasis is on the use of local resources and materials.

HE 4498A/4499B An Interdisciplinary Approach to Gerontology: see N 4900A/4910B for description.

HE 4800A, B, C. Directed Studies in Health Education: 3 credit hours. Prerequisites: Fourth year status; a G.P.A. of at least 2.8; a "B" grade in an earlier class in the area of study (where appropriate); consent of advisor; consent of teacher. The purpose of this class is to allow students to develop an area of specialization with library, laboratory or survey research under the direction of an appropriate faculty member.

Awards and Prizes

For details of awards and prizes in the School of Recreation, Physical and Health Education, please consult the Awards Office publication "Scholarships, Prizes, and Financial Aid."

The Maritime School Of Social Work

Academic Staff 1984-85

Director of School

F.C. Wien, BA (Queen's), MA, PhD (Cornell) Associate Professor and Director

Professors

R.W. Carlson, BA, MSW (Penn.) PhD (Chicago)

R.A. Craig, BA (UNB), MSW (MtA)

J.E. Cummings, BA (Dal), MSW (St FX), DSW (Tor.)

D.P. Kerans, BA (Loyola), MA (St. Louis), STL (Innsbruck), DRS (Strasbourg)

D. O'Brien, BComm, MSW (SMU), Adv. Dip. SW (Penn.), DSW (Penn.)

Associate Professors

M.L. Courtney, BA (Dal), MSW (SMU)

J. Gilroy, BA (Dal), MSW (King's), MA (Tor.)

D. Moore, Dip. Social Studies (London), BA, MA (Dal), PhD (Boston U)

R. Morris, BComm (Dal), MSW (McGill)

R. O'Day, BA (UBC), MA, PhD (Michigan)

D. Williams, AB (Chicago), MSW (Calif.)

Assistant Professors

J.B. Duplisea, BA, MSW (MtA)

G. Fitzgerald, BA (Dal), MSW (King's)

J.R. Harbison, BA, BSS (Dublin, Trinity College), Grad. Dip. SW (Edinburgh)

E. Macdonald, BA (St. Dunstan's), BSW, MSW (Ottawa) (Resident faculty member, Charlottetown)

M.J. MacDonald, BA (UNB), MSW (Dal) (Resident faculty member, Sydney)

B.K. Richard, BA (MtA), MSW (Dal)

E. Ruiz, BA, MA (Boston)

A. Sexton, BA (Honours), MSW (Dal)

R. Williams, BA (Acadia), MA (Tor.)

Lecturers

J.M. Pace, BSW (Dal), MSW (Wilfred Laurier)

Instructor

A. Smith, BA (Leeds)

Sessional Lecturers 1983-84

G. Bevan, BA (St. Dunstan's), MSW (Dal)

F. Bradley, BA, MSW (Dal)

G.C. Burrell, BA, MA (Queen's)

M. Clancy, BA (MSVU), LLB (Dal), LLM (London, Eng.)

Wm. Lawlor, BA (St. Dunstan's), MSW (Carleton)

M. Love, BA (Marianopolis College), BSW (McGill), MSW (Dal)

C. Malmo, BEd, MEd, PhD (Alta.)

M. Matheson, BSc, BSW (Memorial), MSW (Carleton)

F. MacKinnon, BA, BEd, (MtA), MA (Acadia), MSW (Chicago), LLD (St FX)

A. Mirthes, BA (Hunter Coll., City Univ. N.Y.), MSW (Wilfred Laurier)

J. Williams, BSc (Alta.), MSW, LLB (Dal)

E.A. Young, BSW, MSW (Toronto) (Resident Faculty Member, Saint John)

The Maritime School of Social Work seeks to graduate social workers who are aware of regional geographic, political, economic and social characteristics and problems; who are educated for effective practice, and who are innovative in contributing to improved conditions for the people they serve.

1. Bachelor Of Social Work Degree

The Bachelor of Social Work degree program is designed to make social work education both geographically and academically accessible to human service workers and other interested persons throughout the Maritime region. New students may currently be admitted to the BSW program in Halifax and in Charlottetown, and students are also taking BSW courses in Saint John and Sydney. Faculty members travel to provide classes and field instruction at the off-campus centres. Approximately two-thirds of the students work full or part-time in human service positions while studying. Instruction is conducted according to adult education principles allowing students active involvement in decisions about their education.

The Bachelor of Social Work degree program is accredited by the Canadian Association of Schools of Social Work (CASSW).

2. Relationship to the MSW program

The BSW is intended: (a) To provide one, but not the only, route to study at the Master's level; (b) To assure that the BSW curriculum contains the full range of content prerequisite to study at the Master's level.

3. Full-time Studies

A full-time program of study is available on the Halifax campus.

4. Part-time Studies

Classes may be taken on a part-time basis in Halifax. BSW courses may also be taken on a part-time basis in Charlottetown, in cooperation with the University of Prince Edward Island.

5. Micmac BSW Program

The Micmac BSW has been added to the present program offered at the MSSW to meet the needs of the Native Community. The courses have been adapted to include Native content. It is intended for persons currently employed with the Department of Indian Affairs Welfare Programs, the Native Council of Nova Scotia and the Native Alcohol and Drug Program.

6. No Degree Students and Students in Other Degree Programs

Students may be admitted on a No Degree basis to BSW classes in Charlottetown, for a maximum total of two full credits. No Degree students are admitted in Halifax only in exceptional cases and with the permission of the BSW Chairperson.

Students in other Dalhousie degree programs may take BSW classes as electives only by permission of the social work course instructor. Such students should first check the regulations of their Faculty, School or College.

Additional information on any of the above programs may be obtained by contacting the School's Co-ordinator of Admissions.

7. Summer Sessions

A limited number of summer session classes are offered in Halifax and at the off-campus centres. These are announced during the Winter term.

8. University Regulations

Students are expected to be familiar with the University Regulations and the Regulations of the Faculty of Health Professions, which appear earlier in this calendar.

9. Duration of Undergraduate Study

Students must normally complete undergraduate studies within 10 years of their first registration. This rule applies to transfer credit to be used in completing a degree.

10. Workload Regular Academic Year (Fall-Winter)

5 full-credit classes per *academic year* shall be regarded as constituting a normal workload for a student, and may not be exceeded without written permission from the Committee on Studies of the Maritime School of Social Work. Written permission is also required if the planned workload in any *term* would amount to six half-credit classes (i.e. 3 full credits).

11. Maximum Workload — Summer School

No student may take classes totalling more than one full credit in any one Summer Session. Not more than two full credits can be obtained at Summer School in any one calendar year, with the exception that Social Work students may enrol in Field instruction II (2 ½ credits).

12. Limits on Credits — Summer School and Correspondence Classes

In Health Professions, up to six credits (36 credit hours) from Summer School and correspondence classes may be accepted towards the requirements of a degree. In all of the above cases, no more than two full-credits (12 credit hours) may be by correspondence.

13. Credits from other Universities under Concurrent Registration

A student while registered at Dalhousie, wishing to take classes at another institution, must make an application to the Registrar at Dalhousie and provide a description of the classes offered at the other institution. A letter of permission will be provided if approval for the classes is given.

Attention is also drawn to the following General University Regulations:

14. Discipline

Members of the University, both students and staff, are expected to comply with the general laws of the community, within the University as well as outside it.

Plagiarism is considered a serious academic offence which could lead to loss of credit and suspension from the University. Plagiarism may be defined as the presentation by an author of the work of another author, in such a way as to give one's reader reason to think that the other author's work is one's own. A student who is in any doubt as to what constitutes plagiarism is urged to discuss the matter with the instructor concerned *before* completing an assignment.

See also the University Regulations earlier in this calendar.

15. Admission Requirements

(a) Admission of Regular Students

To be eligible for admission to the BSW program, regular candidates are required:

- (i) to have completed at least one year of undergraduate study at a recognized university following Senior Matriculation;
- (ii) to have an academic average of B- or 65%;
- (iii) to show evidence of personal maturity and suitability for social work.

(b) Admission of Mature Students and Those Lacking Normal Admission Requirements

- (i) Persons who lack the normal high school and university preparation may be accepted directly into the BSW program on the basis of their

experience, their demonstrated aptitude for social work, and their potential for achievement at the university level.

- (ii) Candidates are required to show evidence of personal maturity and suitability for social work.

(c) Admission Priorities

Since enrolment is limited, applicants should note that admission is on a competitive basis, according to established priorities. Interviews are not generally required as part of the admission process, but in certain instances the Admissions Committee may require an interview and personal evaluation as part of the selection procedure. Admission priority is given to the following groups:

- (i) Persons Currently Employed in the Human Services: Preference is given to those candidates who are currently employed in the human services in the three Maritime Provinces.
- (ii) Mature Students: Mature students who may not be currently employed in the human services but who, through their life, volunteer and/or previous work experience are able to demonstrate an aptitude for social work and who, through past or recent studies are able to provide evidence of academic ability, are given priority consideration. Preference in this category is ordinarily limited to persons who are at least 25 years of age at the time of application.
- (iii) Persons Who are Members of Minority Groups: The Maritime School of Social Work is committed to a policy of serving more adequately the needs of minority groups by increasing their representation in the student population. Persons from the principal minority groups in the region (Acadian, Black and Native) are therefore encouraged to apply. Minority students are given preference in each priority group.
- (iv) Persons Currently Enrolled In, or Recently Graduated From, Undergraduate University Programs: Applications from students who have completed one year of undergraduate study or who are recent graduates are given careful consideration. Some work and volunteer experience in the human services are helpful assets for the candidate to possess.
- (v) Foreign Students: A small number of foreign students may be admitted every year. Foreign candidates should see the nearest Canadian Consulate with regard to entrance procedures into Canada. Please also read the Article on Language Requirements in this calendar.

16. Application Procedure

Application packages may be obtained from the Registrar's Office, Dalhousie University. Applications, official transcripts, and supporting documents must be received in the Registrar's Office no later than April 15.

Applicants who are attending university at the time of application should ensure that their first-term transcripts are submitted prior to the April 15 deadline date and also that their final transcripts are forwarded immediately following completion of the regular session.

17. Admission Credits

The first five credits of the 20 credits required for the BSW degree are referred to as 'admission credits.' These courses may be completed either before or after acceptance into the BSW program, strictly in accordance with the basis of admission as stated in the Admission Requirements section above:

For all applicants/students, admission credits must meet the following criteria:

- (i) They must be offered by a recognized university or equivalent institution of higher learning, or by certain other institutions for which the work is considered appropriate to an academic program in social work,
- (ii) They must be comprised of general university-level course content in any subject area *other than* social work, and equivalent to the first year

of any undergraduate degree at Dalhousie,

(iii) They must be completed at an average of B- (65%) or better.

Regular Students: Are required to complete the first five nonsocial work admission credits prior to entry to the program.

Mature Students: May complete some or all of the five non-social work credits after admission to the BSW program. Mature candidates are, however, encouraged to complete at least one of these credits prior to application.

18. Advanced Standing

It should be noted that persons possessing a Bachelor's degree must take a minimum of 6 credits under Dalhousie instruction, and persons without a Bachelor's degree must take a minimum of 7 ½ credits under Dalhousie instruction. This regulation sets the absolute limit of credit from all sources which any individual student shall receive.

19. Transfer Credits

Transfer credits towards the BSW may be granted, subject to the following conditions:

(i) Credits accepted for transfer must have been completed within the 10 years preceding the student's projected completion date of the BSW degree program. An extension of this 10-year rule may be granted to accepted students who apply to the Chairperson of the School's Committee on Studies.

(ii) Transfer credit is considered only in relation to acceptable credits previously completed at an average of B-(65%) or better.

(iii) Transfer credits awarded are applied only to the 15 social work credits of the BSW curriculum. (See BSW Curriculum below.)

(iv) The total amount of transfer credit that may be applied to the BSW degree is standardized by the School for certain specific qualifications, such as a previous undergraduate degree with a B average or better, a registered nursing diploma, a social services diploma, etc. For example, accepted candidates who have completed a Bachelor of Arts degree, with the required B-(65%) average, are eligible for a block *transfer credit* of 5 credits, in addition to the 5 admission credits also allowed. (See Admission Credits above.)

20. Competency Credit

Credit for competency, to a maximum of two credits, may be applied for by those students accepted into the program who have had at least 24 months of full-time paid or unpaid employment in the human services, or equivalent.

Accepted candidates must apply for competency credit by September 30th of the year of their first registration in the BSW program, and are encouraged to apply as soon as admitted.

A fee equal to half the regular course fee is charged for each half-credit for competency, and is payable upon registration for competency credit assessment.

Competency credits earned are assigned on an individual basis to classes selected from the 15 social work credits of the curriculum, thus reducing the number of social work credits subsequently required for completion. (See BSW Curriculum below.)

21. New Student Advising Sessions

New students are assisted in planning their classes by curriculum advisors from the School who meet with each student during the initial stage of the scheduled Fall registration sessions. Decisions about which social work classes will be covered by transfer credit are usually made at this time. The possible assignment to particular social work classes of competency credits to be earned in the coming months is also discussed during this session.

22. Student Advisors

Each student is also assigned a student advisor for ongoing consultation concerning any issues or concerns that may arise throughout the year. In the off-campus centres the resident faculty member acts as advisor.

23. Minimum Standing

The Maritime School of Social Work requires that an average of at least B- be maintained. This average is taken after the first five credits, and thereafter cumulatively every five credits. The BSC Committee will be responsible for monitoring the progress of students who receive grade below B- or 65%.

24. Appeals

A student wishing to appeal a decision based on School regulations should consult with the Chairperson of the BSW Committee for advice on appeal procedures.

25. BSW Curriculum

The BSW degree is awarded upon successful completion of 20 credits as outlined below:

(i) Five admission credits as defined in section 17. above.

(ii) Six compulsory credits in Social Work as follows:

1000R Introduction to Social Work (1 ½ credits)

3020R Field Instruction I (1 credit)

4010R Advanced Social Work Practice (1 credit)

4020R Field Instruction II (2 ½ credits)

(iii) Nine Credits as follows: (For many students some of the following credits will be covered by either transfer and/or competency credits.)

3010R Perspectives on Social Welfare Policy (1 credit)

3030R Foundations of Social Work Practice (1 credit)

3040R People in Society (1 credit)

3050A/B Social History of Atlantic Canada (UPEI equivalent: Poli. Sci. 242) (½ credit)

3070A/B Social Service Delivery Analysis (½ credit)

3080R Science and Testing of Practice (1 credit)

3090A/B Social Statistics (UPEI equivalents: Soc. 321, Math 2210, Ed. 481, Psych. 221) (½ credit)

3100A/B Political Economy of Social Welfare in Canada (UPEI equivalent: Poli. Sci. 201) (½ credit)

Social Work in a Special Field of Practice Elective: (½ credit) (Usually an elective offered by the School to provide in-depth study of unmet needs and emerging social work roles in a field of practice selected by the student.)

Social Problem Electives: (1 credit or 2 x ½ credits) (May be social work electives, or electives offered by other Departments or Schools, to provide in-depth study of contemporary social problem issues. Examples of social problem electives are: minority and Ethnic Groups, Deviancy, Women's Issues.)

Free Electives (1 ½ credits or 3 x ½ credits). (Free electives may be chosen from any subject area, including social work.)

In Charlottetown, the social problem electives and the free electives are to be taken at UPEI.

26. Sequencing of Course Credits

Students commencing with the 20-credit BSW curriculum are strongly advised to complete their five admission credits at the beginning of their program or, if this is not feasible, as early in their program as possible.

All students accepted into the program are expected to commence their social work credits during the regular academic session which begins in September.

It is the policy of the BSW Committee that:

- (i) SW 1000R — Introduction to Social Work, be completed prior to the commencement of SW 4010R — Advanced Social Work Practice, and that
- (ii) SW 3020 — Field Instruction I, be completed prior to the commencement of SW 4020 — Field Instruction II.

The sequencing of course work is otherwise determined by the student and is largely dependent on each student's needs within the following guidelines:

- (i) 1000R — Introduction to Social Work should be taken at the beginning of a student's program,
- (ii) Students are advised to take 4010R — Advanced Social Work Practice after 3030R — Foundations of Social Work Practice.
- (iii) 4020R — Field Instruction II should be taken at the end of a student's program.

27. Equipment

All students should supply themselves with a battery operated cassette recorder for use with library cassettes, and for use in field instruction.

28. Scholarships and Bursaries

For information on bursaries, scholarships, and loans, consult the booklet "Scholarships, Prizes and Financial Aid" issued by the Dalhousie Awards Office. For further information consult the Director of Awards, Dalhousie University.

29. BSW Social Work Class Descriptions

1000R Introduction to Social Work: (compulsory). This class is a basic introduction in the student's study of the field and the practice of Social Work. It is primarily a practice class with intensive laboratory-style components, with focus on the ongoing development of communication and interventive skills. An assessment of the students' learning needs and strengths is also carried out. This class is organized in four modules of unequal value: (1) orientation to the field of social work and social welfare (4 weeks), 10% of overall course value; (2) learning needs assessment (4 weeks), 20% of overall course value; (3) introductory communication and relationship skills (6 weeks), 30% of overall course value; and (4) introductory interventive skills (12 weeks), 40% of overall course value.

3010R Perspectives on Social Welfare Policy: This course provides a survey of the history of social welfare in Canada, with a focus on historical debates which shed light on present-day issues; a survey of a variety of perspectives on social problems and social policy issues, with a focus on the various definitions of human needs; and an initial survey of the spectrum of social welfare programs available in the Maritimes. Each student will be asked to undertake an analysis of the policies informing a program of his/her choice.

3030R Foundations of Social Work Practice: Topics relate to the principles and processes of giving and receiving help in one-to-one and in mutual aid interpersonal exchanges, facilitated by a purposeful helper, and

the principles and skills of analysis of developmental and problematic interpersonal, organizational and community change situations.

3040R People in Society: An overall theoretical perspective on the personal, organizational and societal problems facing people today is provided regarding (a) the individual, (b) society and its functioning and (c) the interplay between these two. Emphasis is on extrapolating major conceptual elements of each of these theories in order to develop an integrated diagnostic scheme relevant to the wide range of situations typically encountered in social work practice and fundamental to the theoretical base required by a "generalist" social work practitioner. 3010 Perspectives on Social Welfare Policy: is a complementary class supplying historical and contemporary data, while 3040 provides a preliminary diagnostic framework.

3050A/B Social History of Atlantic Canada: An analysis of the peoples who settled the region, the problems they have faced and their reactions to them are presented, with a focus that gives historical perspective to contemporary social problems.

3070A/B Social Service Delivery Analysis: An appreciation of the social worker's role and responsibility in planning and delivery of social services; an understanding of the ability to apply selected theoretical models of service delivery; proficiency in analyzing and influencing service delivery systems in which social workers participate; and familiarity with some of the recent service delivery innovations in various provinces of Canada are developed.

3080R Science and The Testing of Practice: This is the basic research course in the BSW program. It is a full credit course and is ordinarily offered over two semesters. In the first section, the emphasis is on providing students with a knowledge of the scientific method, a conceptual understanding of the primary terminology of science and the interrelationships between theory, research and practice. In the second section the focus switches to the more pragmatic consideration of evaluating practice.

3090A/B Social Statistics: The aim of this course is to develop an understanding of major basic statistical tools which facilitate interpretation of data derived from social work-related data bases or research. The ability to apply basic forms of analysis to the description of samples, and the ability to draw inferences from samples to populations are provided. Applications rather than mathematical derivations are examined in exploring the practical significance and limitations of statistics. Concepts explicated are: prediction, models, level of measurement, probability, inference, and quantification. Statistics developed include: measures of central location, dispersion, regression, association, confidence intervals, and selected tests of significance with emphasis on multivariate applications.

3100A/B Political Economy of Social Welfare in Canada: The structure of government and the nature of bureaucracy; the nature of federal, provincial, municipal relations; the historical development of social policy within a context of federal taxation and provincial initiatives; and aspects of parliamentary forms as related to social policy development are covered. A critical analysis of the welfare state and its functions vis-a-vis social development on the one hand, and social control and economic planning on the other, are central concerns in this course.

4010R Advanced Social Work Practice (compulsory): Selected theories of personal and social change are critically examined from the perspective of social work practice for the development of analytical and practical skills in preparation for professional practice.

Field Instruction

The field component of the program is controlled and supervised by the Maritime School of Social Work faculty. There is provision for seminars,

workshops, consultations, etc., in order to assist the students with testing content from academic classes. Content not taught in the classroom but necessary to a specific field of practice is introduced as required, including such topics as law and social work, housing policy, and employment policy and practice.

3020R Field Instruction I (compulsory): This initial field placement provides an opportunity for beginning social work practice under supervision of agency personnel in liaison with School faculty. The student develops beginning competencies in direct practice situations, working with individuals and small groups. Use of agency and community resources, policies and services, as well as influence toward positive change are studied. Approximately 200 hours.

4020R Field Instruction II (compulsory): The major field placement offers a faculty-supervised opportunity for the development of counselling, social change and community action skills sufficient for entry into practice situations upon graduation. The student becomes increasingly proficient in service situations requiring counselling, and can recognize the need for influencing policy, program or process within the place of field practice in order to carry out professional responsibilities in the community. The student must develop a proposal to be submitted to the School and to be approved by the Field Coordinator prior to beginning the practicum. The proposal must be in by March 15 for practicums beginning in summer, by March 30 for those beginning in September and by October 30 for those beginning in January. A manual is available to aid the student in its preparation, as well as outlining the expectations for satisfactory completion of the practicum. The Field II practicum is done at or near the end of a student's program. Minimum of 500 hours. Proposals should be sent to: Field II Coordinator, Maritime School of Social Work, Dalhousie University, Halifax, N.S. B3H 3J5.

BSW Credits for Competency

2500A Learning Through General Work Experience (½ credit)

2510B Self Analysis and Personal Development (½ credit)

2520C Specific Social Work Skills (½ credit)

2530D Non-credit Structured Learning Experiences (½ credit)

2540E Knowledge of Special Field of Practice (½ credit)

A student may not apply for more than three (3) of A, B, C and D. Thus maximum credits allowable are two: — one and a half (1 ½) for three of A, B, C and D; and ½ credit for E.

BSW Elective Classes

The number of elective classes offered each year is limited. The following is a list of classes that have been offered at the School; they are not, however, offered each year.

13170A/B Feminist Counselling

3180A/B Family Counselling

3200A/B Law and Social Work

3210A/B Social Work in the Medical Field

3220A/B Minority Group Issues for Social Workers

3230A/B Women and Social Change

3240A/B Community Work Approaches to Social Work Practice

3250A/B Social Work in Corrections

3260A/B Social Work in Industry

3270A/B Social Work in Addictions

3280A/B Social Planning: Theory and Applications

3290A/B Counselling in Social Work Practice

3300A/B Independent Study

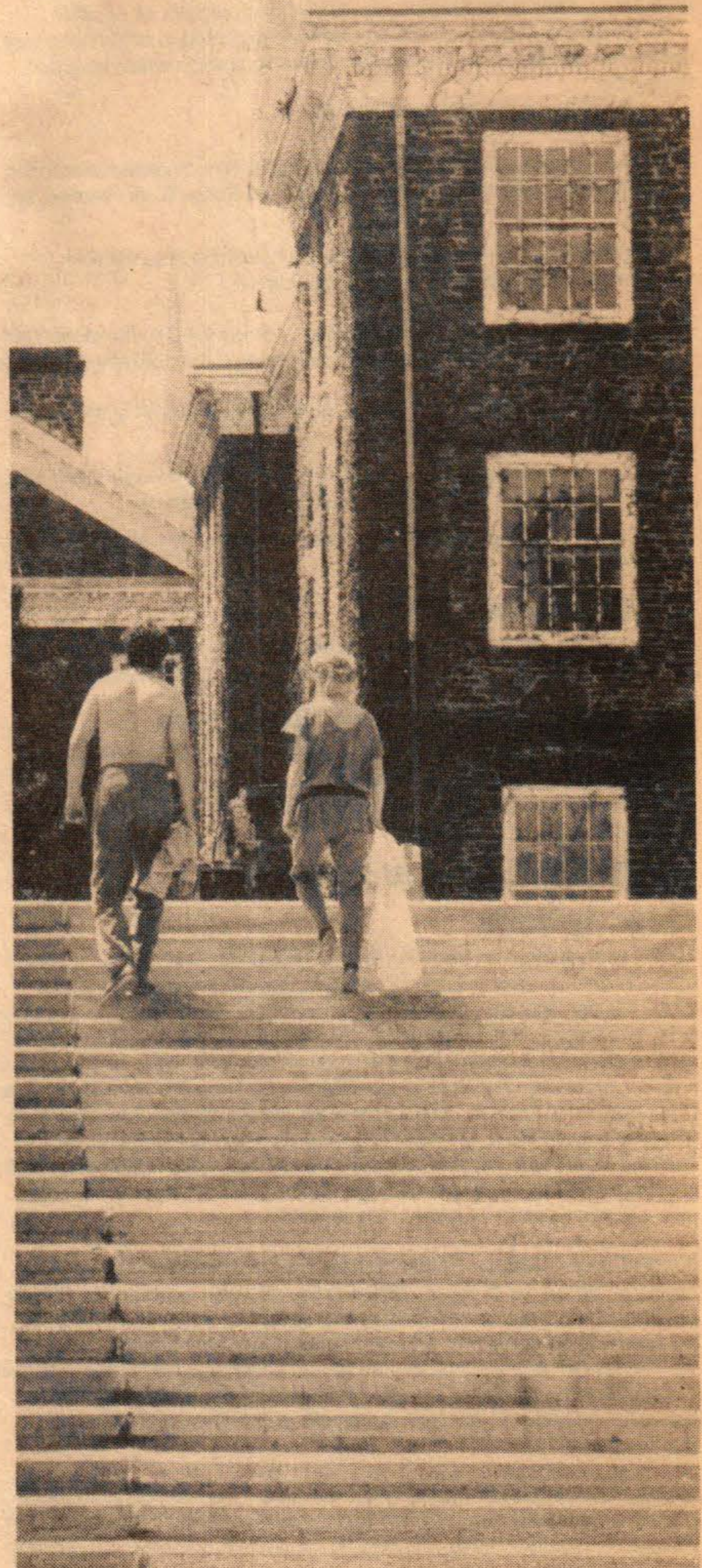
3310A/B Rural Social Work

3320A/B Social Work and the Aging

3340A/B Social Work with Exceptional Children

3350A/B Social Work with Groups

4400A/B Family and the Law



Faculty of Management Studies

The Faculty of Management Studies offers undergraduate programs in Commerce (BComm) and Public Administration (Certificate). Students wishing to enroll in programs offered by the Faculty should address themselves directly to the Schools concerned for further information or for help in planning courses of study.

Faculty Officers

Norman Horrocks, Dean, 3621 Killam Library, Telephone 424-2582

John H. Scheibelhut, Director, School of Business Administration, 6152 Coburg Road, Telephone 424-7080

Norman Horrocks, Director, School of Library Service, Faculty of Graduate Studies, 3621 Killam Library, Telephone 424-3656

Peter C. Aucoin, Director, School of Public Administration, 1229 Le Marchant Street, Telephone 424-3742

Two undergraduate programs are offered in the faculty. One leads to the degree of Bachelor of Commerce, and is administered by the School of Business Administration. The other leads to the Certificate in Public Administration and is administered by the School of Public Administration.

School of Business Administration

The School of Business Administration offers a curriculum of undergraduate and graduate studies designed to equip students to serve the community in business, government, and the professions. The undergraduate program includes studies in the humanities and social sciences and in the functional areas of business. Recognition is given to the growing emphasis on quantitative and behavioural analysis.

Academic Staff 1984/85

Director of the School

John H. Scheibelhut

Director, International Business Centre

Alan M. Rugman

Coordinator, MBA Program

M. Eileen MacDougall

Coordinator, BComm Program

Robert G. Blunden

Professors

C.R. Brookbank, BA, MA, PhD (Toronto)

G.R. Chesley, BComm (MtA), MA, PhD (Ohio), CA

M.A.H. Dempster, BA (Toronto), MS, PhD (Carnegie-Mellon), MA (Oxford), (Roy A. Jodrey Chair)

C.R. Dipchand, BComm, (Queen's), MBA (Sask.), PhD (Western)

R.E. George, BSc (London), MA (Bristol), PhD (London), Wm. A. Black Chair

M.J.C. Martin, BSc, (Nottingham), PhD (Sheffield)

J.D. Misick, BA (Dal), MBA (Col.)

J.R.E. Parker, BComm (Dal), MBA (Wash.), C Phil (Mich.), CA

G.S. Roberts, AB (Oberlin), MA, PhD (Boston College)

A.M. Rugman, BA (Leeds), MSc, (Lond.), PhD (Simon Fraser)

J.H. Scheibelhut, BSc, (Notre Dame), MBA (Ind.), PhD (Oregon)

R.G. Storey, BBA (UNB), MBA (Queen's), PhD (Mich. State)

Associate Professors

B.C. Archibald, BA (Queen's), MSc (Stanford), PhD (Waterloo)

A.A. Atkinson, BComm, MBA (Queen's), MSc, PhD (Carnegie)

M.R. Brooks, BOT (McGill), MBA (Dal), PhD (Wales)

D.C. Cherry, BComm (Dal), MBA (McM), RIA

C.J. Dirksen, MBA (Oregon), BS (Santa Clara), PhD (Oregon)

J.F. Duffy, BS, MS, PhD (Iowa)

R.A. Ellison, BSc (UNB), MBA (McM), PhD (Tennessee)

R.H.R. Glube, BSc (Dal), MBA (Chicago), PhD (Cranfield)

R.E. Klapstein, BSc (Calg.), BA (Alta.), MBA, LLB (Dal), LLM (Osg. H.)

S.O. Larsson, BSc, (SGW), MSc (Alta.), PhD (UBC)

L.C. MacLean, BA, BEd, (St FX), MA, PhD (Dal)

R.N. Maddox, BA, MBA, PhD (Ohio)

L.W. Mealiea, AB, MBA (Rutgers), PhD (Mass.)

A. Oppong, BSc (Ghana), MBA (Chicago), PhD (Iowa), CGA

D.J. Patton, BA (UNB), MA (Toronto), DBA (Indiana)

P.J. Rosson, Dip MS (Salford), MA (Lancaster), PhD (Bath)

R.S. Sandhu, BSc, BCL, LLM (Delhi), LLM (Yale), MBA (Dal)

Y. Sankar, BA (McG), MA (Tor.), PhD (Johns Hopkins)

D.A. Schellinck, BSc, MBA (Dal), PhD (Illinois)

E.W. Scott, BComm (Dal), MBA (Col.), RIA, CA

Y. Shafai-Sahrai, BSc, MPA (Tehran), MBA, PhD (Mich.)

R.A. Street, BComm LLB (Dal), MBA (Western), LLM (Dal)

Y.B. Yalawar, BComm, MComm (Karnatak), MBA, PhD (Ohio State)

G.E.R. Zinck, BComm (Dal), BEd (MSV), CA

Assistant Professors

J. Barzilai, BSc, MSc, DSc (Technion)

T.K. Clarke, BS Nautical Science (Calif. Maritime Acad.), PhD (Illinois)

I. Fooladi, BS (Iran), MA (Tehran), MS, PhD (Oregon)

A.M. Ireland, BA (Chatham Coll.), MSc (Carnegie-Mellon), MBA (Dal), CA

S.J. Kamath, BA (Delhi), MBA (Indian Inst. Mgt.), MA, PhD (Simon Fraser)

P.C. Lam, BComm (Dal), MBA (McGill), PhD (Manchester)

B.W. MacLean, BComm, MBA (Dal), CA

A.C. Peacock, BA, MA, PhD (UWO)

P.C. Secord, BComm, MBA (Dal), RIA, CIA

Lecturers

R.G. Blunden, BComm (Dal), MM (Northwestern)

H.A. Wier, BComm (SMU), CA

Part-time Faculty

J. Barger, BS (Pace), BEd, MA (Dal)
 R. Carroll, BBA, BEd (St FX), MBA (Dal), CGA
 F. Crane, BA (Acadia), DPA, MPA (Dal)
 J. Gratwick, BSc (London), FCIT
 T.A. Lister, BA (Alta.), MBA (Dal)
 P. Markus, BSc, LLB, MBA, (Dal)
 M.E. MacDougall, BSc, MBA (Dal)
 C. McManus, BEng (NSTC), MBA (Dal)
 D. Moulton-Barrett, BA (Dal)
 D. Othen, BA, MA (Oxon.), MBA (Dal), PhD (Alta.)
 E. Rubin, BComm (Dal), MSc (New York)
 R.M. Sparkman, BSIE (Northwestern), MBA (William and Mary), PhD (Houston)
 T.E. Withers, BComm, MBA (Dal)

Bachelor of Commerce

In all classes the main effort is directed towards analysis of the principles which govern traditional and contemporary practice. The principles are related to current developments in business, government and society at large, and special discussion meetings are arranged in which recognized authorities participate.

The students may follow a general program of study or choose a measure of concentration in one of nine special areas: Accounting, Economics, Finance, Management, Marketing, Public Sector Management, Quantitative Methods, Computing Science in Commerce, and Small Business Management.

The school is committed to providing students with the opportunity to obtain a degree through part-time as well as full-time study. The normal pattern of part-time study consists of the equivalent of three full classes each year, two in the regular academic year and one in the summer. Part-time students are reminded of University policy which limits programs of study to ten years from the date of initial registration.

Competency in the English Language

All students entering the Commerce program must satisfy the school as to their competency in the English language. This competence is normally demonstrated by satisfactory performance in a written examination (not for credit) administered by the School of Business Administration. This examination must be written in the student's first year in the program. The examination is held three times each year — normally in the first week of each term (September and January) and in the week following the Spring examination period (April). Students who fail the English examination must attend special English workshops until they are able to show evidence that they have attained a level of proficiency equivalent to that required to pass the English examination. Students normally are not permitted to enter the second year of the Commerce program until they have passed the English test or satisfied the standards of the English proficiency workshop. A student who fails to satisfy the school as to competency in the English language cannot be recommended to Senate for the awarding of a degree.

Admission Requirements

Admission requirements and procedures are essentially the same as those for Arts and Science (see page 22).

The following additional conditions apply:

Grade XII University English is required.

Grade XII Accounting is an acceptable subject.

Grade XII University Preparatory Mathematics is required.

An average of at least 65 per cent is required.

General Information and Regulations

Student Aid, Scholarships, and Other Awards: A brochure is available from the Awards Office, Dalhousie University.

Information on the following will be found in the Arts and Science section of this calendar:

Admission to Classes: (page 23),

Registration: (page 23),

ID Card: (page 23),

Withdrawal and change of registration: (except that permitted withdrawal dates differ. See the almanac, page 24),

Transfer Credit: (page 26),

Advanced Placement: (page 26),

Part-time Students: (page 26),

Audit of Classes: (page 26),

Duration of Program: (page 26),

Assessment: (page 27),

Repeating Classes for which a passing grade has been awarded: (page 28),

Merit Points: (page 28),

Workload: (page 28).

Degree Requirements**General Program (Without Honours)**

Four years of study are required comprising the equivalent of 20 full classes. Not more than the equivalent of 8 full classes may be at the 1000 level.

The classes in the program are divided into four categories as follows:

Required Core Area Classes: Commerce 1101A/B, 1102A/B, 1401A/B, 1501A/B, 2201A/B, 2301A/B, 2302A/B, 2501A/B, 2502A/B, 2601A/B, 3501A/B, 4350R; Economics 1100R, 2200A/B or 2201A/B or 2220A/B or 2221A/B; Mathematics 1000A and 1010B, or 1100R*.

*Note: Mathematics 1100 is specifically designed for the Commerce program, but is not normally accepted as the prerequisite for upper level mathematics or computing science classes.

Core Area Electives: the equivalent of 3 full classes to be selected from offerings in the core area of Commerce, Economics and Mathematics (including Computing Science).

Non-Commerce Electives: the equivalent of 5 full classes chosen, subject to the approval of the School of Business Administration, from all classes offered in the University, except those designated as Commerce classes. At least 2 of these classes must be follow-up classes, i.e., be classes which provide further development of the subject matter introduced in lower level classes (these will most frequently be classes at the 2000 level and above). Classes which do not have a lower level prerequisite are not considered follow-up classes.

Free Electives: the equivalent of 3 full classes chosen, subject to the approval of the School of Business Administration, from all classes offered in the University.

Honours Programs

Honours programs may be designed with an area of concentration in Accounting, Finance, Management, Marketing, Public Sector Management, and Quantitative Methods, or without an area of concentration. The Honours program of each student must be approved by the Director of the School of Business Administration or his appointee. Students are advised to seek such approval prior to registering for their fourth year of study.

The requirements of the honours program are those of the BComm program with the following changes:

(a) one of the full class equivalents within the core area electives must be a class designated as an Honours Seminar, (b) the student must attain an average grade of at least B- in all classes beyond the first year, (c) the student must obtain a grade of at least B- in the designated Honours Seminar, (or in the case of unconcentrated Honours where two MBA classes are taken in lieu of the Honours Seminar a grade of B must be obtained in each of them), and (d) to obtain First Class Honours students must, in addition to the above requirements, attain an average of A- aboth (1) for all classes in the core area of Commerce, Economics and Mathematics, and (2) for all twenty classes.

Students in the honours program must maintain a level of performance satisfactory to the School in each year of study. If this standard is not maintained, the student may be required to transfer to the general program. In particular, admission to undergraduate Honours Seminars listed in the calendar is restricted to (a) students with an average grade of at least B- in all classes taken in the second and third years of the BComm program; (b) students who have completed the group of prerequisite classes in the relevant subject area and related fields prior to the start of the fourth year; (c) students who obtained an average grade of at least B+ in the group of prerequisite classes. Students failing to meet the foregoing standards for admission to an Honours Seminar may be admitted, in special circumstances, by the Director of the School or his delegate. Students wishing to follow an honours program without an area of concentration should consult the Director or the Coordinator concerning the requirement for unconcentrated honours.

Counting of Classes Towards Two Undergraduate Degrees

A student who holds a BA or BSc and who wishes to gain a BComm must fulfill the requirements of the BComm and meet the following stipulations:

- (a) only classes that are applicable to the BComm may be counted for credit.
- (b) each class carried forward must bear a grade of "C" or higher.
- (c) a minimum of eleven new classes must be taken of which eight must be in the core area.

Required Standing

In order to qualify for the degree, candidates must have obtained a minimum of sixteen merit points in the twenty classes required. This minimum is adjusted in proportion to the number of Dalhousie credits received relative to the total number of credits required.

For the minimum acceptable standing for Honours see Honours Program (above).

Required Withdrawal

Students who have not passed at least half of the classes for which they are registered after the final date of withdrawal without penalty, will be considered to have failed the year, and will be required to withdraw from their programs.

Readmission After a Failed Year

Students who have failed their year on the first occasion in Management Studies may re-apply to the Faculty for re-admission consideration. A student who has twice failed a year or who has been required to withdraw

twice will be ineligible for readmission to the Faculty as either a full-time or a part-time student. Ordinarily an appeal is allowed only if illness has seriously interrupted the student's studies and this is established by submission to the Registrar of a medical certificate from the physician attending the student at the time of illness.

Off-Campus, Summer School and Correspondence Classes and Classes Taken at Other Universities under Concurrent Registration

See the Arts and Science section of this calendar, but note that the maximum number of classes that may be gained from summer school and correspondence classes combined is seven. Certain work in the School of Business may be offered by correspondence.

Appeals

Any student suffering undue hardship from the application of any of the regulations of the Faculty may appeal for relief to the Academic Studies Committee.

Almanac

The almanac is given on page 4. All concerned should note dates of registration, examinations, convocations, permitted withdrawals, etc.

Fees

Information about fees is given on page 16.

Changes in Regulations

In general, any change which affects a currently registered student adversely will not apply to that student. Any student suffering *undue hardship* from application of any of the regulations may appeal for relief to the Academic Studies Committee.

Senate Regulations

In addition to the above Faculty Regulations, students are reminded that they must also comply with the University Regulations printed at the front of this calendar pages 14 to 15. Particular attention is drawn to the University Regulation which refers to plagiarism, on page 14.

Without An Area of Concentration

Year 1: Commerce 1101A, 1102B, 1401A/B, 1501A/B; Economics 1100R; Mathematics 1000A and 1010B, or 1100R; one non-Commerce elective.

Year 2: Commerce 2201A/B, 2301A, 2302B, 2501A, 2502B, Economics 2200A/B or 2220A/B or 2201A/B or 2221A/B; two non-Commerce electives. (Students planning an Honours program without an area of concentration should do one core area elective and one non-Commerce elective.)

Year 3: Commerce 2601A/B, 3501A/B; one core areas elective; two non-Commerce electives; one free elective.

Year 4: Commerce 4350R; two core area electives; two free electives. (Students in an Honours program without an area of concentration should do one core area elective and one non-Commerce elective.)

With An Area of Concentration

Accounting

Year 1: As for those without an area of concentration.

Year 2: Required core area classes: Commerce 2201A/B, 2301A/B, 2501A, 2502B; Economics 2200A/B or 2201A/B or 2220A/B or 2221A/B; Core area electives: Commerce 2110A/B, 2111A/B, 2112A/B; One non-Commerce elective.

Year 3: Required core area classes: Commerce 2302A/B, 2601A/B, 3501A; Core area electives: Commerce 3113A/B, 3115A/B, 3120A/B; 1 ½ non-Commerce electives; Free elective: Commerce 3201A/B or one half class chosen from those listed for the fourth year.

Year 4: Required core area classes: Commerce 4350R; 1 ½ non-Commerce electives; Free electives: Commerce 4101A, 4102B, 4111A/B, 4113A and one of 2602A/B, 3202A/B, 3203A/B, 4120A/B or 4150B.

The professional accounting bodies allow certain exemptions in respect of classes taken in the School of Business Administration. These differ from province to province. Particulars can be obtained from the provincial offices of: The Institute of Chartered Accountants, The Association of Certified General Accountants, The Society of Management Accountants, The Chartered Institute of Secretaries.

Economics

Year 1: As for those without an area of concentration.

Year 2, Year 3 and Year 4: As for those without an area of concentration except for the electives listed below in the program choices. To ensure that the prerequisite requirements of the 3000 level and 4000 level Economics classes are met, students must postpone one or more of the 2000 level Commerce classes to the third or fourth years. The School of Business Administration should be consulted in regard to the class(es) to be postponed. The Economics Department offers a number of program choices. Business Administration students may choose to do from 4 ½ to 6 classes in Economics in any of these program areas in conjunction with the requirements and electives outlined above. Further information on these program choices is available from the Economics Department brochure.

Canadian Development Studies: Economics 2232 and 2250/4440 plus 2 ½ to 4 classes from Economics 2220A/B, 3325, 3326A, 3328, 3329, 3330A, 3336B.

Economic Analysis and Policy: Economics 2220A/B or 2221A/B and 4 to 5 ½ classes from: Economics 2231B, 3324, 3325, 3326A, 3328, 3330A, 3338, 4426B, 4431B, 4432.

Economics and Government: Economics 2220A/B or 2221A/B, 3324, 3326A, 4426B, and 2 to 3 ½ classes from Economics 2232, 3328, 3329, 3330A, 3331A, 3336B, 4431B, 4432, 4433B.

Labour and Society: Economics 2220A/B or 2221A/B and 3325; Commerce 3303A/B and 3304A/B; and 3 to 4 ½ classes from Economics 2231B, 2232, 2241A, 2250, 3324, 3338, 4432.

Regional and Urban Economics: Economics 2220A/B or 2221A/B, 3324, 4432, and 2 to 3 ½ classes from: Economics 3330A, 3331A, 3332B, 3336B, 3340, 4440, 4433. Other program choices offered which might interest Business Administration students include: Economic Development in Historical Perspective, International Development Studies, Mathematical Economics and Econometric Models, Resources and Environment.

Finance

General

Year 1: As for those without an area of concentration.

Year 2: Required core area classes: Commerce 2201A/B, 2501A, 2502B; Economics 2201A/B or 2221A/B. Core area electives: Commerce 2111A/B or 3100A/B, Economics 2200A/B or 2220A/B. Two non-Commerce electives.

Year 3: Required core area classes: Commerce 2301A, 2302B, 2601A/B, 3501A/B. Core area electives: Commerce 2112A/B or 3101A/B, 3201A/B;

one full class chosen from those listed for the fourth year. One non-Commerce elective.

Year 4: Required core area class: Commerce 4350R. One non-Commerce elective. Recommended free electives totalling three full classes: Commerce 2602A/B, 3113A/B, 3202A/B, 3203A/B, 4120A/B, 4200R (for Honours students), 4201A/B; Economics 3324R, 3326A/B.

Actuary Science in Commerce

The nine required core area classes listed under the general program including: Mathematics 1000A, 1010B. Core Area electives: Mathematics 2000, 2600B; Computing Science 1400A, 1410B, 2270B, 2350A; Commerce 3201A/B; MBA 6206. At least one of Commerce 3202A/B or 3203A/B; Five non-Commerce electives; One-half free elective.

Management

Year 1: Required core area classes: as for those without an area of concentration. Non-Commerce elective: Psychology 1000 or 1010.

Year 2: Required core area classes: Commerce 2201A/B, 2301A, 2302B, 2501A, 2502B; Economics 2200A/B or 2220A/B or 2201A/B or 2221A/B. Two non-Commerce electives of which one should be sociology 1200.

Year 3: Required core area classes: Commerce 2601A/B, 3501A/B. Core area electives: Commerce 3300A/B, 3304A/B, 3305A/B and one half other class chosen from the core area; Two non-Commerce electives.

Year 4: Required core area class: Commerce 4350R. Electives to the equivalent of five full classes chosen in consultation with the School of Business Administration, one of which must be Commerce 4300R for Honours Students.

Marketing

Year 1: Required core area classes: as for those without an area of concentration; non-Commerce elective: Psychology 1000 or 1010.

Year 2: Required core area classes: Commerce 2201A/B, 2501A, 2502B, 2601A/B. Core area electives: Commerce 3401A/B, and one of Commerce 2401A/B, 2402A/B, 3406A/B. Two non-Commerce electives of which one should be Sociology 1200.

Year 3: Required core area classes: Commerce 2301A, 2302B, 3501A/B; Economics 2200A/B or 2220A/B or 2201A/B or 2221A/B. Core area electives: Commerce 3404A/B, and one of Commerce 2401A/B, 2402A/B, 3401A/B, 3402A/B, 3406A/B, 3407A/B, 3408A/B, 4538A/B. Two non-Commerce electives.

Year 4: Required core area class: Commerce 4350R. Electives: 4401A/B and at least one of the core area electives not taken from those suggested in Years II and III, or Commerce 3403A/B, 3405A/B, 4413A and 4450B (For Honours Students); and other free electives to a total of five full classes.

Public Sector Management

By following the suggestions in this field of study and by making a selection of the appropriate Commerce electives, the student can obtain a functional concentration within the general field of public sector management.

Common to all Public Sector Management Concentrations

(a) The nine required core area classes listed under the general program.
(b) Four classes in political science including: Political Science 2200, 2250, 4240. (c) Two and one half classes in Economics including: Economics 2200A/B or 2220A/B or 2201A/B or 2221A/B (whichever was not taken to satisfy the core area class requirement), Economics 3324.

Functional Concentrations

I Accounting and Financial Management: Four and one-half classes including: Commerce 2110A/B, 2111A, 2112A/B, 3113A/B, 3115B, 3201A/B, 3203A/B, 4105A/B or 4106A/B.

II Computer Systems: Four and one-half classes including: Commerce 2110A/B, 2111A, 2112A/B, 3113A/B, 3115B, 4111A/B, Mathematics 2250A/B, 2270A/B.

III Finance: Four and one-half classes including: Commerce 3100A, 3101B, 3201A/B, 3202A/B, 3203A/B; Economics 3338.

IV Governmental Marketing: Commerce 3401A/B, 3404A/B, 4401A/B, Non-Profit Marketing (one-half class to be developed), 3303A/B, 3304A/B, Psychology 1000 or 1010.

V Management: Four and one-half classes including: Commerce 3303A/B, 3304A/B, 3305A/B; Psychology 1000 or 1010, 2120A, 2080B.

VI Quantitative Methods: Four and one-half classes including: Commerce 3100A/B, 3101B, 4501A/B, 4537A/B, 4538A/B; Economics 3338. One class in Mathematics above the 1000 level.

Quantitative Methods

Year 1: As for those without an area of concentration. Students planning to take further courses should take Mathematics 1000A and 1010B in their first year.

Year II, Year III and Year IV: As for those without an area of concentration except that suggested Commerce electives are as follows: Commerce 4500R, 4501A/B, 4537A/B, 4538A/B, 4542A/B. Students wishing to concentrate in the Quantitative Methods area are advised to consult the calendar listing of the Department of Mathematics for additional class offerings of interest. For all the prerequisite requirements of the higher level Mathematics classes to be met, students may have to postpone one or more of the 2000 level Commerce core classes to the third or fourth year. The School of Business Administration should be consulted in regard to the class(es) to be postponed.

Computing Science in Commerce

A Commerce student can earn the equivalent of either a major or a minor in Computing Science as part of the normal requirements for a Commerce degree. If the student wishes to achieve the equivalent of a minor in Computing Science, the following program is recommended:

Year 1: Commerce 1101A, 1102B; Economics 1100R; Mathematics 1000A and 1010B, Computing Science 1400 (Introduction to Computing Science), 1410 (Applications and Algorithms); One non-Commerce elective.

Year 2: Commerce 1401A/B, 2201A/B, 2501A, 2502B, 2112A/B; Economics 2200 or 2201 or 2220 or 2221; * Computing Science 2450 (Introduction to Computer Systems), 2610 (Data Structures and Algorithmic Analysis); One non-Commerce elective.

Year 3: Commerce 2301A, 2302B, 2601A/B, 2110A/B, 3501A/B, and 2111A/B (for an Accounting orientation) or 3201A/B (for a Quantitative Methods orientation); Computing Science 2350 (Introduction to File Processing); One non-Commerce elective; One half free elective.

Year 4: Commerce 4350R, 3115A/B, and 3113A/B, 4111A/B (for an Accounting orientation) or 4501A/B, 4538A/B (for a Quantitative Methods orientation); Computing Science 3250 (Data Base Management Systems

Design); One non-Commerce elective. One free elective. A student wishing to earn the equivalent of a major in Computing Science should take Math 2070 and 2080 in place of Commerce 2501 and 2502 in the second year; Computing Science 3690 (Programming Languages) and another half-class in Computing Science (see list below) as electives in the third year; Computing Science 3700 (Operating Systems I) and another half class in Computing Science as electives in the fourth year. The elective classes in Computing Science can be drawn from 3090 (Computers and Society), 3810 (Microcomputers in the Real World), 4140 (Software Design and Development), or any other classes listed in the calendar under Computing Science. Other classes which might be taken as electives to develop more of a concentration in Accounting or Quantitative Methods can be found in the preceding sections of this program guide.

Small Business Administration

Year 1: As for those without an area of concentration.

Year 2: Required core area classes: Commerce 2201A/B, 2301A, 2302B, 2501A, 2502B. Core area electives: three of Commerce 2110A/B, 2401A/B, 2402A/B, 3100A, 3101B, 3303 or 3304. One non-Commerce elective.

Year 3: Required core area classes: Commerce 2601A/B, 3501A/B, and Economics 2200A/B or 2220A/B or 2221A/B. Core area electives: Commerce 3307A/B and two of Commerce 2602, 3201, 3306, 3401, 3402, 3406, 4120, 4534 or 4541, or core area electives listed above but not yet taken. Two non-Commerce electives.

Year 4: Required core area class: Commerce 4350R. Three full class equivalents from the core area electives listed in years II and III as yet untaken or non-Commerce electives. One non-Commerce elective.

Classes Offered

The School has adopted a four digit numbering system. The former numbers used prior to the 1981-82 academic year, are shown in brackets. *Note: Each of the following A/B classes may be offered only as A or B. Check the current timetable to determine in which term the class is offered. If no prerequisite is given for a class, none is required.*

1101A/B (101) Introductory Accounting I: An introduction to the principles and practices used by accountants in processing and communicating data both within and outside the entity. Emphasis on financial statement accounting and reporting with the following objectives: (1) To introduce financial accounting methodology and the related problem-solving skills, (2) To introduce the theoretical framework upon which financial statement accounting is based, (3) To develop an understanding of the information content of conventional financial statements and the inherent limitations of accounting information.

1102A/B (103) Introductory Accounting II: Prerequisite: Commerce 1101. Management accounting is emphasized with a view to: (1) Identify the information needs of management, and (2) Examine the various means accounting uses to meet management needs. Topics such as the Statement of Changes in Financial Position and financial statement analysis are also studied.

1401A/B (108) Introduction to Marketing: lecture 3 hours. The student receives a basic understanding of the character and scope of marketing and its role in business operations with focus upon the concepts and techniques a business must employ to anticipate and satisfy consumer needs. Emphasis on the tools available for the marketing manager, the problems to be confronted and the development of understanding and analytical ability in the following: the role of the consumer; product-line development; channels of distribution; pricing systems; selling and promotional activities. Case

materials and problem sets are used to give insight into the analytical tools used in problem analysis and decision-making. No previous training in marketing is assumed, although some knowledge of accounting is helpful.

1501A/B (106) Introduction to Computers in Business Management: lecture 3 hours. Students are introduced to and familiarized with the basic concepts of computers and electronic data processing in a business management context, rather than in the context of computer science or computers and their societal impacts. Two major areas are concurrently taught: conceptual foundations and computer programming. Students write a set of BASIC programs and run them on the computer as part of the class requirements.

2110A/B (458) Data Processing Systems: lecture 3 hours. Prerequisites: Commerce 1102 and 1501. This class begins an in-depth study of the elements of data processing, data representation and organization, hardware alternatives, software alternatives, systems analysis and design, internal control and actual applications to data processing situations. Material builds upon the basis in Introductory Accounting and Introduction to Computers in Business Management.

2111A/B (Part of 310) Financial Accounting Procedures: lecture 3 hours. Prerequisites: Commerce 1101, 1102 with at least a B- average or permission of instructor. This class conducts an in-depth study of financial accounting procedures such as accounting for income tax, leases, share capital, earnings per share, accounting changes, the Statement of Changes in Financial Position, and cash flows. The emphasis is on the application of generally accepted accounting principles and financial statement presentation and disclosure requirements.

2112A/B (301) Cost Accounting: lecture 3 hours. Prerequisites: Commerce 1101 and 1102 with a B- average or permission of instructor. Cost Accounting practices and concepts help manufacturing, service, not-for-profit and most other types of organizations in their planning, analysis and control functions. Topics such as cost accumulation, standards, budgeting and allocation are studied in depth.

2201A/B (207) Introduction to Managerial Finance: lecture 3 hours. Prerequisites: Commerce 1102 and Economics 1100. An introduction to the problems business managers face in the acquisition and effective use of the firm's financial resources and analytical concepts for evaluating financial decisions. How the firm can achieve successful interaction with its external environment and make an appropriate contribution to the operation of the economy is considered. Essential background knowledge: An understanding of economic principles and environment in which a business operates and sufficient knowledge of accounting processes and principles to enable the student to use financial data intelligently.

2301A/B (215) Organizational Behaviour: lecture 3 hours. Insight into human behaviour in organizations and capacity for objective analysis is developed. Research and text material drawn from the fields of sociology, anthropology and psychology are used in the development of understanding and objectivity. Case material and substantive data from the behavioural sciences are considered.

2302/B (216) Organizational Theory: lecture 3 hours. Prerequisite: Commerce 2301. This class surveys both theory and research pertaining to complex organizations with emphasis on design, structure and administrative practices in the environmental setting and how the interaction of these variables relate to organizational performance. Concomitant with this exposure to theory and research, students have the opportunity to apply this knowledge to case studies relevant to complex organizations. Emphasis is on the analysis of case studies and the formulation of general solutions and decisions for action.

Note: It may not be possible to offer all the classes listed below in every year. Students should bear this in mind when planning their program for the following year.

2401A/B (219) Channels of Distribution: lecture 3 hours. Prerequisites: Commerce 1102, 1401. This systems approach to Channels of Distribution Management explains the forces working on the Marketing Manager as he selects his channel of distribution. The major problems facing retailers and wholesalers and how these relate to the consumer, the manufacturer and society are summarized. Concentration is on the management problems faced in the distribution of goods and services, as well as the channel alternatives available to the manager including vertical and contractual marketing systems.

2402A/B (223) Sales Management: lecture 3 hours. Prerequisite: Commerce 1401. Sales Management is designed to provide an understanding of the tasks and problems facing today's sales manager and to familiarize one with current sales force management practice. Specifically, this class provides an exposure to the concepts, techniques and procedures in buyer-seller relations, salesmanship, organization of the sales force, personnel management, selection, sales training, motivation, compensation, evaluation and supervision, budgets, quotas, territories and sales control. Extensive use is made of the case method and classroom discussion is used to extend the basic text material and examine other points of view.

2501A/B (204) Statistics for Economics and Business I: lecture 3 hours. Prerequisite: Mathematics 1000 level, or consent of instructor. (Commerce 2501A and 2502B are equivalent to Economics 2222A and 2223B. Commerce students must register for Comm. 2501 and 2502. Only 1 credit can be counted towards a B.Comm degree from the following — Commerce 2501, 2502, Economics 2222A, 2223B, and 2228R.) An introduction to the principles and applications of statistics relevant to business and economics, with emphasis on making inferences based on observed data. Topics covered include descriptive statistics, probability, random variables, estimation, hypothesis testing.

2502A/B (205) Statistics for Economics and Business II: lecture 3 hours. Prerequisite: Commerce 2501. A continuation of Commerce 2501. Topics covered include Decision Theory, Regression and Correlation, Time Series, Index Numbers, an introduction to the use of statistical packages on the computer, and management uses of statistical data.

2601A/B (213) Legal Aspects of Business — Contracts: lecture 3 hours. An appreciation of some of the legal problems that might be faced by the Business Community. The meaning and sources of law, machinery of justice; the law of torts; formation of contracts, capacity to contract, legality of object, mistake, misrepresentation, statute of frauds, privity of contracts, interpretation, breach and discharge of contracts, and the law of agency. Students must make extensive use of the law library in writing reports on a series of cases.

2602A/B (214) Commercial Transactions: lecture 3 hours. Prerequisite: Commerce 2601. This follow-up to Commerce 2601 examines the law relating to the sale of goods, bailment, contracts of employment, negotiable instruments, real property, tenant and landlord, mortgages; partnerships, corporations, devices for securing credit and the rights of creditors. Students must make extensive use of the law library in writing reports on a series of cases.

2701A/B Business Communication: lecture 3 hours. Prerequisite: English Competency Exam. The goal of this class is to teach students how to properly prepare both written and oral business communications. The stress will be on written communication, specifically business memos, letters and reports although communication theories and the role of communication in business will be discussed. As well, one oral presentation per student will be required.

3100A (212) Financial Accounting and Investigation: lecture 3 hours. Prerequisite: Commerce 1102. Credit for this will be removed from the admissible classes for a BComm degree if Commerce 2111 is also taken. This class is intended for non-accounting students. This class investigates areas introduced in Introductory Accounting to provide a more detailed understanding of topics such as cash flow, working capital flow, valuation, generally accepted accounting principles, leases, pensions, and consolidations. Emphasis is placed on investigating the financial position and prospects of organizations using various data sources in addition to those conveyed in financial statements.

3101B (312) Managerial Accounting: lecture 3 hours. Prerequisite: Commerce 2201. Credit for this class will be removed from the admissible classes for a BComm degree if Commerce 2112 is also taken. This class is intended for non-accounting students. An exploration of the use of accounting information, especially cost analysis, by management in planning and controlling organizations. Topics include budgeting, cost systems, reports and information. This class demonstrates the information base for managers with financial management, marketing management, operations management and personnel management.

3113A/B (Part of 310) Financial Accounting Theory: lecture 3 hours. Prerequisite: Commerce 2111 or permission of instructor. The concepts underlying external reporting constitute the material for this course. Principles of asset and liability valuation, revenue and expense recognition, and income definition are examined in depth. Difficulties with present practices and proposed alternatives are explored.

3115A/B Information for Decision Analysis: lecture: 3 hours. Prerequisites: Math 1100, Comm. 2112, 2502, 3501, or permission of instructor. The information requirements of various commonly used decision analysis approaches are examined. Some common information forecasting and developmental approaches are studied. Examples include accounting information for linear programming, regression forecasting statistical sampling.

3120A/B Information for Organizational Control: lecture 3 hours. Prerequisites: Com. 2112, 2301 or permission of instructor. Financial systems for organizational control in both the public and private sectors are analyzed in detail to evaluate and develop such control systems. Case analysis is used extensively to look at structures such as investment centres, profit centres and cost centres.

3201A/B (307) Intermediate Finance: lecture 3 hours. Prerequisites: Commerce 2201A/B and 3101 or 2111. A more intensive study of capital budgeting, cost of capital and valuation theory than that of Commerce 2201. Emphasis is on long term capital and the bargain for funds vital in financing the business enterprise. Case analysis is used extensively.

3202A/B (331) Security Analysis: lecture 2 hours. Prerequisites: Commerce 2201, 2502 and Economics 2201 or 2221. Introduces the theory and philosophies of investment, and concentrates on investment analysis suitable for the individual, the estate or small group. The focus is on marketable securities, stocks, bonds, and investment trusts. Case material is primarily Canadian and covers such areas as growth stocks, new issues, convertibles, closed end funds, mutual funds, and warrants. Reading assignments and case analysis provide opportunities to handle investment analysis and portfolio management on a problem basis.

3203A/B (332) Canadian Capital Markets: lecture 2 hours. Prerequisites: Economics 2201 or 2221, Commerce 2201. The latter may be waived with the consent of the instructor. Canada's capital markets and the flow of funds within them. Main sectors in the capital markets are identified and their historical development and function within the total structure is emphasized.

Other areas include term structure and risk structure of interest rates, the risk-return relationship on financial assets and the efficiency of Canada's capital markets. Reading assignments, case analysis, evaluation of available research results and classroom discussion comprise the class.

3210A/B Insurance and Risk Management in the Corporate Setting: Prerequisites: Commerce 1102, 2201, 2302, 2502, Economics 2200 or 2201 or 2220 or 2221. Basic concepts of insurance, insurance market organizations, types of insurance and the development of programs for corporate risk management. Problems of implementation and administration are also considered.

3303A/B (323) The Personnel Function: lecture 3 hours. Prerequisites: Commerce 2301 and 2302. Covers the various personnel processes required in organizations which employ a large number of people. Such organizations must deploy personnel on the basis of skills (task specialization) and be concerned with staffing appraisal, training and development, compensation, collective bargaining, handling grievances, health and safety, leadership and justice with respect to employees. Knowledge of the processes is supplemented by the development of analytical skill in coping with various personnel problems and in the integration of the processes with the many other functions required in the organization. This "system and process" analysis builds upon the skill and knowledge acquired in the class on Organizational Behaviour. Cases simulate work environments. The role of personnel management and administration of the personnel function are analyzed.

3304A/B (324) Labour Relations: lecture 3 hours. Prerequisites: Commerce 2301, 2302 or permission of instructor. Introduces students to some practical and theoretical aspects of labour-management relations in Canada. Examines historical, legal, behavioural, economic and political background of our system. Emphasis is on the key processes of industrial relations as they impinge on the activities of managers. Cases used are drawn mainly from Canadian sources.

3305A/B (325) Individual And Organizational Change: lecture 3 hours. Prerequisites: Commerce 2301 and 2302, or permission of instructor. Current concepts and methods of individual and organizational change. The primary objective: to develop the student's skills as a change agent and improve performance as a manager, using lectures, exercises and case studies. The opportunity to fine tune those analytical and decision-making skills necessary for the effective introduction of change into complex organizations, enabling the student to 1) identify those situations where change is appropriate, 2) develop effective change strategies, 3) implement planned change and 4) effectively monitor the change process.

3306A/B (322) Interpersonal Dynamics: lecture 3 hours. Prerequisite: Commerce 2302 or permission of instructor. A more intensive study of the processes and possible problems associated with the dynamic interaction between individuals. Building upon Commerce 2302 and employing such techniques as sensitivity training, structured exercises in interpersonal relations, and case studies.

3307A/B (305) Small Business Management: lecture 3 hours. Prerequisites: Commerce 1102, 1401, 2201, or permission of instructor. Written and oral cases used to adapt and apply business principles to small-business situations. Students must strengthen their knowledge of basic business functions, use information sources, and organize these into workable recommendations for managing a variety of small businesses.

3308A/B (306) Survey of Business Processes and Retail Management: lecture 3 hours. A survey for non-Commerce students who wish to have an overview of the management problems facing the operator of a retail or service business. Primarily designed for Pharmacy students, but open to Arts

and Science students without previous Commerce classes. Commerce 3307 is the class for Commerce students who are interested in this topic. Students may count for credit only one of Commerce 3307 and 3308.

3401A/B (313) Buyer Behaviour: lecture 3 hours. Prerequisite: Commerce 1401. In view of the very competitive situation in Western business, the firm that is successful designs and sells products that meet the desires of specific consumer segments. Thus, analysis and prediction of consumer behaviour are increasing in importance and sophistication. An extensive body of research evidence from Marketing and the Behavioural Sciences is explored and evaluated to assess the marketing implications of elements of consumer behaviour. The emphasis of the class is empirical research on an outside project. The theoretical background for the projects and their progress are discussed in class. Students must do a considerable amount of background reading from the text and outside sources. Some Mathematical modeling of the consumer processes is accomplished.

3402A/B (315) Marketing Communications: lecture 3 hours. Prerequisite: Commerce 1401. Recommended: Commerce 3401, 3404. The communication tools of Advertising, Sales Promotion, and Public Relations are presented as part of the overall Marketing Mix. Positioning, segmentation, and other marketing concerns will be studied as they relate to the firm's communications situation. Problems of the promotion manager will be presented to help students appreciate those factors which affect promotional decisions. The Promotion Plan will be used as the integrating force for the material presented.

3403A/B (317) Special Topics in Marketing: lecture 3 hours. Prerequisites: Commerce 1401, and at least one of the following: Commerce 2401, 3401, 3402, 3404. A special interest seminar for senior level marketing students. The particular topics to be discussed are at the discretion of the instructor. Interested students should consult the School.

3404A/B (318) Marketing Research: lecture 3 hours. Prerequisites: Commerce 1401, 2502 or consent of instructor. The scientific method in solving marketing problems. Emphasis on planning and formulating research problems, research design, application of sampling methods, statistical design of experiments, and analysis of data collected. A real-life research project is required, its nature to be determined considering student interest and background.

3405A/B (321) Export Marketing: lecture 3 hours. Prerequisites: Commerce 1102, 1401 and Economics 1100. Stresses the knowledge required by those involved in exporting. Topics dealt with include trade barriers, agencies which assist Canadian exporters, and international marketing strategies possible to penetrate these markets.

3406A/B Retailing: lecture 3 hours. Prerequisite: Commerce 1401. Retailing is designed to provide an understanding of the functions, problems and practices of retail management. It provides an exposure to location planning, layout, organizational structure, retail personnel management, buying, pricing, retail accounting and control mechanisms.

3407A/B Physical Distribution Management: lecture 3 hours. Prerequisites: Commerce 1401 and 3501, or permission of the instructor. An introduction to the decision problems faced by the manager of a physical distribution system: to achieve co-ordination of the channels of distribution, the transportation and storage of products, and the communications and data processing system, to minimize the total cost of these activities and satisfy the marketing requirements of the firm. Topics include customer service, order processing, traffic management and transportation, packaging, inventory management, distribution centres, physical distribution organization and systems controls.

3408A/B Transportation Modes and Policy: lecture and seminar 3 hours. Prerequisite: Completion of first two years of Commerce program, or permission of instructor. This course examines the development and operation of the various transportation modes and national transportation policy in Canada. Topics include characteristics, cost structures and pricing decisions of the various modes (air, pipeline, rail, road and water); the National Transportation Act and other relevant legislation; the structure of the industry and government agencies; regulation; subsidies; current and emerging freight and passenger issues (with particular reference to the role of transportation in the Atlantic Region).

3501A/B (341) Operations Management: lecture 3 hours. Prerequisites: Mathematics 1000-level, Commerce 1501 and 2502. An introduction to some standard analytical tools and techniques used in the field of production and operations management. An appreciation for the interaction of operations management with other management systems within the organization is developed.

3601A/B (335) The Law of Business Associations: lecture 3 hours. Prerequisite: Commerce 2601. Modern business operating through various forms of associations, in particular the corporation, raises complex problems: (a) the choice of the form of business enterprise, (b) the nature of the corporate personality; (c) the dual system of incorporation; (d) the corporate constitution; (e) the contracts between the corporation and outsiders; (f) the control and management of a corporation, (g) the capital structure of a corporation in the raising and maintenance of capital; (h) the securities legislation, and (i) the organic changes in a corporation through mergers, amalgamations, sale of assets, take-overs, reorganization, receivership and winding up. Improved understanding of the complexities of the field while providing indispensable minimal skills essential in reaching well-formulated decisions is the objective.

3602A/B (336) The Consumer and the Regulation of Business: lecture 3 hours. Prerequisite: Commerce 2601. Complexities in the relationships between the consumer, business and government continue to increase. A rapidly expanding body of law designed to regulate these relationships in an effort to promote freedom of contract has developed. Of particular concern are problems relating to quality and safety of goods and services, warranties and guarantees, misleading advertising, unfair trade practices, the regulation of consumer credit, and legal remedies. Some of the more critical problems, the legal remedies available, and the role of administrative tribunals, their jurisdiction, and their procedures and policies are examined.

3701A/B (410) The Firm in the International Environment: Prerequisites: Commerce 1102, 2201, and Economics 2200 or 2220 or 2201 or 2221. The effects of the major focus in the international environment on the nature and form of international business arrangements. Topics include: theories of private direct foreign investment, controls of cross-border trade and financial flows, international business negotiations and effects on business of changes in national economic policies.

4101A Advanced Topics in Accounting I: lecture 3 hours. Prerequisites: Commerce 2111, 2112. Advanced procedural and conceptual topics in financial and managerial accounting are studied. A host of topics introduced in earlier classes are examined in depth, as well as a number of topics in accounting not previously studied.

4102B Advanced Topics in Accounting II: lecture 3 hours. Prerequisite: Commerce 4101. This class continues from Advanced Topics in Accounting I. Part of this class is devoted to an extensive study of consolidations. Investigation procedures for specific financial problems faced by various types of organizations are used.

4105A/B (455) Accounting for Medical Care Organizations: Prerequisites: Commerce 3113, 3120. Medical care accounting is studied to ascertain the peculiarities of information requirements and accounting practices in this area.

4106A/B (456) Accounting for Governmental Organizations: Prerequisites: Commerce 3113, 3120. Accounting practices and possibilities for both internal and external reporting are studied at various levels of government.

4107A/B (457) International Accounting: Prerequisites: Commerce 3113, 3120. Comparable accounting practices in various countries are studied for both internal and external accounting and reporting problems. Foreign currency translation methods are also reviewed.

4111A/B Public Auditing: lecture 3 hours. Prerequisites: Commerce 2110, 2111, 2112, or permission of the instructor. Recommended: Commerce 3115, 3120. The responsibilities of the public auditor and the procedures used to fulfill these responsibilities are examined in detail, to provide an understanding of the audit process and the degree of reliance one can place on audited financial statements.

4113 A Contemporary Issues in Accounting: lecture 3 hours. Prerequisite: Commerce 3113. Current issues in accounting and recent accounting literature are examined to provide a familiarity with the direction of accounting developments, and a basis for future study of accounting problems and practices. This class is required for, but not restricted to, Honours students in Accounting.

4120A/B (320) Taxation: lecture 3 hours. Prerequisites: Commerce 1102 and Economics 1100. An introduction to the taxation system in Canada, with special reference to the provisions of the Income Tax Act and their effect on business decisions. *Essential background knowledge and technical skill:* knowledge of economic principles and the economic environment in which a business operates and the ability to work with accounting information.

4121A/B Advanced Taxation: lecture 3 hours. Prerequisite: Commerce 4120. A more detailed examination of the corporate taxation system in Canada; how tax planning for both individuals and corporations can be a significant element in the regular business decision-making process, especially for the private corporation.

4150B Research in Accounting: seminar 3 hours. Prerequisite: Commerce 4113. An average grade of at least B+ in Commerce 3113, one of Commerce 2111 or 2112, one of Commerce 2110 or 2201 or 3201, one of Commerce 2302 or 2602, and one of Commerce 2502 or 3115. This class provides the opportunity for students to undertake both directed and independent study of selected topics in accounting. A major research paper is required. This class is open to Honours students only.

4200R (460) Seminar in Finance: Prerequisites: Either 3202 or 3203 and an average of B+ in Commerce 2201, 2502, 3201, Economics 2200 or 2220 or 2201 or 2221. Special seminar restricted to Honours students in Finance.

4201A/B (411) International Financial Management: Prerequisite: Commerce 1102, 2201, 2502, 3701 and Economics 2200 or 2220 or 2201 or 2221. The factors that affect the financial function when a firm engages in international trade and investment. Topics include the international monetary system, sources of international financing, remitting of funds from foreign subsidiaries, accounting for operations abroad and the foreign exchange market.

4300R (470) Seminar in Management: Prerequisites: Commerce 3305 or ½ credit in Psychology at the 2000 level and a B+ average in Commerce

2301, 2302, 2502, 3303, 3304, Economics 2200 or 2201 or 2220 or 2221. Special seminar restricted to Honours students in Management.

4350R (311) Planning for Profit and Social Responsibility: lecture 3 hours. Prerequisites: Commerce 1102, 1401, 1501, 2201, 2301 and 2302. The role business plays in our society; the economic, social, legal and political environment in which firms operate; the effect of these environmental constraints and opportunities on business decisions; the way in which business decisions are made and implemented; management practices.

4401A/B (319) Marketing Strategy: lecture 3 hours. Prerequisites: Commerce 1401, and at least one of the following: Commerce 2401, 3401, 3402 or 3404. This course is designed to integrate the learning that has taken place in previous specialist marketing courses offered in the Commerce program. Extensive use will be made of case studies requiring students to develop complete marketing strategies for companies in "real-life" situations. Student presentations of their case analyses will form an important part of the course.

4402A/B Independent Study in Marketing: Prerequisites: Commerce 1401, 3404 and two other half classes in Marketing. The content of this class is negotiated with an individual instructor. The class offers the student the opportunity to explore in greater detail any particular area of interest in Marketing.

4413A Advanced Topics In Marketing: Prerequisites: Commerce 3401, 3404, at least ½ other class in Marketing at the 2000 or 3000 level. This class carries students beyond the basic tools of Marketing, developing an understanding and appreciation of the value of theory in Marketing. (This is a required class for Honors Marketing students).

4450B Honours Thesis in Marketing: Prerequisites: Commerce 4413A; Commerce 4401B must be taken concurrently with this class. An average grade of B+ in all Marketing classes beyond Commerce 1401. Students write an Honours thesis demonstrating their ability to gather, analyze, and synthesize data leading to new knowledge useful in understanding Marketing. Special seminar restricted to Honours students in Marketing.

4500R (471) Seminar in Quantitative Methods: Prerequisites: B+ average in Math at the 1000-level, Commerce 2501, 2502, 3501. Commerce 4501 must be taken concurrently with this class. Special seminar restricted to Honours students in Quantitative Methods.

4501A/B (328) Operations Research: lecture 3 hours. Prerequisites: Mathematics 1000-level, Commerce 1501, 2502, or consent of the instructor. Formulating management problems in mathematical terms and discussing methods of solving such problems with the computer. Topics include transportation problems, network analysis, non-linear programming and waiting lines, with emphasis on applications rather than theory.

4534A/B (434) Managing Technological Entrepreneurship: Prerequisites: All required core area classes, except Commerce 4350, or consent of instructor. High technology based industries face unique management problems imposed by the rapid rate of technological change and the often uncertain environmental impacts of technological innovations. This class examines some of the techniques that have recently been developed to improve management effectiveness in high technology organizations and their responsiveness to environmental concerns.

4537A/B (437) Case Applications of Operations Research: Prerequisite: Commerce 4501 or consent of instructor. A seminar in which case teaching methods are used to explore how OR and statistical techniques are applied to "real-life" management problem situations. The class analyzes a series of management problem situations developing appropriate OR models to evaluate alternative management actions.

4538A/B (438) Applied Multivariate Analysis: Prerequisites: Mathematics 1000-level, Commerce 1501 and 2502 or consent of instructor. The convenience of packaged statistical programs (e.g. SPSS) has opened the area of data analysis to researchers with a wide variety of backgrounds. Since it is possible to operate "canned" programs without understanding advanced mathematics, there is a need for a class designed around a packaged statistical program, (SPSS) which introduces the user to the basic concepts underlying the techniques. An introductory class in multivariate analysis for students in business and economics. Students use and interpret statistical programs with data sets from such business areas as marketing, finance and organizational behaviour.

4541A/B (441) Operations Management in Service Industries: Prerequisite: Commerce 3501. A sequel to Commerce 3501 examines the applications of Operations Management concepts and techniques to service industries. It is management problem/case oriented and based upon material specifically developed for such a class.

4542A/B (442) Intermediate Production: lecture 2 hours. Prerequisite: Commerce 3501. A sequel to Commerce 3501 examines selected topics in greater depth than is possible in an introductory class. As part of the requirements, each student prepares a major report on a subject agreeable to the student and the instructor.

School of Public Administration

The school offers four programs in Public Administration, three of which (MPA, MPA(HSA) and DPA) are graduate programs described in the calendar of the Faculty of Graduate Studies.

Applicants to the School who hold a previous university degree should consult the Faculty of Graduate Studies calendar, or write to the School for further information.

Academic Staff

Kell Antoft, BA, MA (Dal), Professor (Sabbatical)
 Peter Aucoin, BA (SMU), MA (Dal), PhD (Queen's), Professor Director
 Herman Bakvis, BA (Queen's), MA, PhD (UBC), Associate Professor
 Murray G. Brown, BA (W.Ont.), MA (Queen's), AM, PhD (Chi.), Associate Professor
 M.Paul Brown, BA (MtA), MA (Dal), PhD (Tor), Assistant Professor
 David M. Cameron, BA (Queen's), MA, PhilM, PhD (Tor.), Professor
 Wayne D. Cochrane, BA (Hons), LLB (Dal), Lecturer
 William J. Coffey, AB (Dart.), MA, PhD (UWO), Association Professor
 F. Michael Cleland, BA (UBC), MPI (Queen's), Lecturer
 L.A. Currie, BSc (St FX), MSW (Dal), Cert. in Social Science (Labour College of Canada), Diploma in Gerontology (Mt.St. Vincent), MPA (Dal), PhD pending (Dal), Lecturer
 Murray G.K. Davidson, BComm (Tor.), MPA (Dal), CA, Lecturer
 Roy S. Gunn, BComm (Dal), CA, Lecturer
 J.E. Hodgett's, BA, MA (Tor.), PhD (Chi.), Adjunct Professor
 Barbara Jamieson, BA (UBC), MA, PhD (Toronto), Assistant Professor
 J.Douglas Love, BA, MA (U. of Tor.), Lecturer
 Thomas W. Kent, MA (Oxon.), Adjunct Professor
 Anu M. MacIntosh, BA, LLB (Dal), MPH (Harvard) Lecturer
 Lawrence J. Nestman, BComm (Sask), MHSA (Alta.), CA, Professor
 Dale H. Poel, AB (Calvin College), MA (Western Michigan), PhD (Iowa), Associate Professor
 A. Paul Pross, BA, MA (Queen's), PhD (Tor) Professor

A. Peter Ruderman, BS, MS, PhD (Harvard) M.BA (Chicago), Professor
 Alan D. Thompson, MB, ChB (Aberdeen), MSc (Social Medicine) (Lond.), Lecturer
 C.C. Tuck, BComm (St. Pats.), MPA (Syracuse), Professor (On Leave)

The Certificate in Public Administration (CPA) Program

The CPA is intended primarily for public servants who do not have a degree. The program consists of undergraduate classes designed to provide a general introduction to the structure and organization of government and the principles of public administration.

Admission Requirements

The program leading to the Certificate in Public Administration is available to persons who meet the undergraduate admission requirements of Dalhousie University and who are not enrolled in a program leading to a first degree. Those not meeting the formal admission requirements may apply for admission under the "Special Cases" provision described earlier in this calendar.

Course Requirements

PS 2200: Canadian Government and Politics
 PS 2250: Introduction to Public Administration
 Commerce 1101A: Accounting I
 Commerce 1102B: Accounting II
 Commerce 2301A: Organizational Behaviour
 Commerce 2302B: Organizational Theory
 One elective credit eg. Economics

For descriptions of classes required of, or available to, Certificate students, please consult the departmental entries elsewhere in this calendar.

Application Procedure

Application forms are available from the Admission Office of Dalhousie University. Applications should be submitted as early as possible, and not later than August 15, in the academic year in which studies are to commence.

Further information on the Certificate or other programs of the School of Public Administration may be obtained from: Administrative Secretary, School of Public Administration, Dalhousie University, Halifax, Nova Scotia, B3H 4H6, (902-424-3742).

Part-time Study

Students may complete the program through part-time study at the rate of not more than two and one-half credits during the academic year. One further credit can be taken in each summer session.

Credits

Normally, four of the five credits in the program must be taken at Dalhousie University and at least three of the five credits after the student has registered in the program.

Classes taken for the Certificate may be credited toward a Bachelor's degree, but a student must complete at least five of the subjects required for the degree after the awarding of the Certificate.

The Special Certificate Program

In certain circumstances the School may consider applications for the graduate Diploma Program from individuals who do not satisfy the general requirements for admission to the Faculty of Graduate Studies. Individuals with a minimum of ten years work experience in administrative positions who either have completed a full year of university study, or have completed a relevant correspondence program (such as the Institute of Public Affairs' Municipal Administration course) can be considered for a qualifying year, in which a special course of study would be arranged leading to a Certificate in Public Administration. Successful completion of the Certificate with an average grade of B+ and with no grade below B-, would constitute a basis for a recommendation from the School for admission to the Faculty of Graduate Studies.

Institutes and Centres

A number of special institutes for study and research in specific fields are based in the University. Among these are:

The Institute of Public Affairs

Acting Director: Michael S. Cross, BA, MA, PhD

Aided by a grant from the Rockefeller Foundation, Dalhousie University established its Institute of Public Affairs in 1936. The Institute was conceived as an experimental centre, a bridge between University and community in the area of social science and public policy.

The work of the Institute involves applied research and continuing education in four program areas: (1) social and economic policy studies; (2) public administration; (3) industry, with programs for developing management capability, for training labour leadership, and for developing effective management-labour relationships; and (4) community service. Institute activities focus on matters of regional, provincial, and local concern.

While the Institute of Public Affairs has no direct responsibilities towards academic programs, many of the Institute's educational and research projects involve faculty members of academic departments and schools of Dalhousie University and other universities. Moreover, Institute staff members teach at the graduate and undergraduate levels, and regularly are invited to consult and to participate in research programs of University departments. In the past, Institute research activities have provided opportunities for graduate students to participate in studies related to their own academic pursuits.

The Institute's full-time staff comprises professionals in economics, geography, political science, sociology, psychology, adult education, business management, and public administration. This core staff is augmented by persons who hold joint appointments in the Institute and other departments of the University; in addition, over fifty visiting fellows, special lecturers, researchers, and resource persons contribute to the Institute's work.

The recently completed Henson Centre, on the southeast corner of University Avenue and Seymour Street, is designed as a conference centre for the Institute's own programs and as a community meeting facility. Institute staff are available to assist groups in organizing and conducting workshops, seminars, and other events. The Institute of Public Affairs Library serves the Institute's own research staff, and is open to students and faculty of the University and to the general public. The Institute Publications Unit, which publishes and distributes Institute-related studies, conference reports, occasional papers and reprints, has a current list of more than one hundred titles.

The Atlantic Institute of Criminology

Director: Robert C. Kaill, BA, MDiv, MA, PhD

The Atlantic Institute of Criminology has been established to provide a criminological research and career-development facility in the Atlantic Region, equivalent to those existing in other regions of the country. Scholarships for graduate students in Criminology have already been announced for the current academic year. An interdisciplinary graduate program in criminology is also projected.

Policy for the Atlantic Institute of Criminology is the responsibility of an Advisory Board comprising twelve representatives from the academic and professional community of the region. Associate memberships are available to interested and qualified persons. Workshops and training courses provide opportunities for professional development for employees of the Criminal Justice system in the Atlantic Region.

Dalhousie Ocean Studies Program

Director: Edgar Gold, BA, LLB, PhD, FNI, MCIT, MRIN

The Dalhousie Ocean Studies Program (DOSP) was established in the summer of 1979, chiefly as the result of a major five-year negotiated grant from the Social Sciences and Humanities Research Council of Canada and substantial support by Dalhousie University. DOSP's current research activities include: (1) economic zone policy and legislation studies; (2) marine pollution regulation studies; (3) Canadian shipping law and policy studies; (4) studies of ecosystem management problems in the Gulf of Maine and Bay of Fundy; (5) Nova Scotia rural coastal community studies; (6) maritime boundary delimitation studies; (7) studies of ocean law, policy and management in the Eastern Caribbean; and (8) bibliographical services in ocean law, policy and management. Extension into further study areas is planned. DOSP has also undertaken training responsibilities in the field of ocean law, policy and management in conjunction with other institutions, and participates in a wide range of conference and workshop activities in many parts of the world.

The Institute of Oceanography

Director: Anthony J. Bowen, MA, PhD

Established in 1959, the Institute has received continuous support through grants from the National Research Council of Canada. It forms part of a major marine research establishment in the Halifax area and maintains the Aquatron Laboratory, a marine research facility containing large seawater tanks and controlled-environment labs. The facility is available to researchers from universities, governments, and the private sector.

The Atlantic Research Centre for Mental Retardation

Director: M.W. Spence, MD, PhD

Established in 1967, the Centre conducts basic biomedical research and population studies in the field of mental retardation. It also provides education in this field to undergraduate and graduate students and the general public. Special tests and consultative services for the prevention and treatment of diseases causing mental retardation are provided by the Centre. The Centre's professional staff hold appointments in various departments of the Faculty of Medicine. Its work is supported by grants from agencies such as the Medical Research Council of Canada, the Department of National Health and Welfare, the Scottish Rite Charitable Foundation of Canada, and the governments of the three Maritime provinces, and by private donations.

The Atlantic Region Magnetic Resonance Centre

Director: W.E. Jones, BSc, MSc, PhD

Established in 1982 with assistance from the Natural Sciences and Engineering Research Council, the Centre is concerned with teaching and research programs in magnetic resonance. The Centre has modern nuclear magnetic resonance (NMR) and electron spin resonance (ESR) instruments including a 360 MHz Narrow Bore Nicolet NMR instrument. In addition to providing well-equipped laboratories and instrumentation for resident and visiting faculty, research scientists and students, the Centre provides NMR spectra and expertise to scientists of eleven universities and research institutes in the Atlantic Region.

The Centre for Foreign Policy Studies

Director: Robert Boardman, BSc, PhD

Established in 1971 with the assistance of a grant from the Donner Canadian Foundation, the Centre is concerned with teaching, research and other professional activities in various aspects of foreign policy and international politics. The work of the Centre is concentrated in the following areas: Canadian Foreign Policy, Maritime and Strategic Studies, and International Political Economy and Developmental Studies. Geographical specializations include African, Chinese, European and American foreign policy.

The Centre is affiliated with the Department of Political Science at Dalhousie University. Centre faculty offer courses in the Department on international relations, foreign and defence policy at both undergraduate and graduate levels. They also supervise masters and doctoral students in these fields.

The Trace Analysis Research Centre

Director: D.E. Ryan, BSc, MA, PhD, DIC, DSc

With the assistance of a grant from the National Research Council, the Centre was established in 1971 to train analytical chemists and, through research, to contribute to the advancement of analytical chemistry. A major facility of the Centre is a low-power nuclear reactor (SLOWPOKE) which is available to researchers within Dalhousie and elsewhere.

The Institute for Resource and Environmental Studies

Director: A.J. Hanson, BSc, MSc, PhD

This Institute was established in 1973 with a supporting grant from the Province of Nova Scotia. It provides a mechanism for coordinated and interdisciplinary research on natural resource management and environmental problems of applied significance in Canada or abroad. The Master of Environmental Studies graduate degree program is offered through the Institute.

The Centre for African Studies

Director: T.M. Shaw, BA, MA, PhD

This Centre, established in 1975, coordinates a teaching and research program in African Studies. Its staff hold primary appointments in departments in the social sciences and the humanities. It organizes postgraduate/staff seminars on Africa and encourages interdisciplinary interaction at all levels on African subjects and issues.

The Centre for International Business Studies

Director: A.M. Rugman, BA, MSc, PhD

The Centre was established in 1975 with the aid of a grant from the Department of Industry, Trade and Commerce. Its purposes include the provision of specialist training in international business studies and research in international business. It carries out these functions within the administrative framework of the School of Business Administration.

The Canadian Centre for Marine Transportation

Director: John Gratwick, BSc

Established in 1977 with federal and provincial support, the Centre encourages interdisciplinary studies of marine transportation issues from a Canadian perspective. Centre research studies are funded by various public and private sector sources. Student research assistantships which result, provide research experience in the marine transportation field. The Centre also facilitates graduate student applications for "Transportation Fellowships" offered annually by Transport Canada.

Centre for Regional and International Development Projects

Director: R.I. McAllister, MA, Dipl. Econ. Dev., MA

Associate Director: F.M. Cleland, BA, MPI

Established on January 1, 1979, this Centre fosters involvement by Dalhousie faculty and students in selected Canadian regional and international economic development projects including exchange programs for faculty and students. The Centre is responsible for the direction of a number of training and applied research projects in Ghana, Zimbabwe, the European Economic Community, and in Northern and Eastern Canada. The Centre fosters interdisciplinary seminars on development issues and publishes reports and papers undertaken by the Centre. Project support is from a variety of sources, including the Canadian International Development Agency, Council of Maritime Premiers, Institute for Research on Public Policy, and several provincial governments.

Centre for Research in Sensory Psychology and Medical Physics

Director: D.M. Regan, BSc, MSc, DIC, PhD, DSc

Established in 1979, the Centre is supported by grants from the MRC, NSERC, Multiple Sclerosis Society of Canada, NEI (DHEW) and the U.S. Air Force. It links the Departments of Physiology and Physics with the Departments of Medicine, Ophthalmology, Otolaryngology, Pediatrics and Psychiatry. Its aims are (a) to carry out research into diseases that affect vision, hearing and the central nervous system, and (b) to carry out research into visual guidance of vehicles and aircraft.

Centre for Marine Geology

Director: J.M. Hall, BSc, PhD

The Centre for Marine Geology was founded in 1983 to promote the interdisciplinary study of the continental margins and the sea floor. The Centre draws on the faculty and resources of the Departments of Geology, Oceanography and Physics and others. The objectives of the Centre are: (1) to expand the university's leading role in international studies of the oceanic crust, (2) to participate with industry and government in the geological aspects of oil and gas development on Canada's east coast and (3) to continue research on sedimentation and the recent history of the Canadian offshore.

Continuing Education

Continuing Education at Dalhousie is the university's newest academic unit, constituted on 1 October 1984. It was created to serve the needs of part-time and adult learners, both those pursuing degree programs and those studying in non-credit classes. The formation of Continuing Education at Dalhousie signals the university's commitment to make itself more accessible to those who have particular educational needs: those who can study only on a part-time basis; those who cannot attend during the working day; those who are returning to study after an absence from formal education; those seeking to improve skills and qualifications through degree, non-credit or special programs.

Continuing Education at Dalhousie has brought together two existing agencies, the Office of Part-Time Studies and Extension, and the Institute of Public Affairs. The former has had responsibility for summer school, general interest extension classes and the expansion of part-time studies. The latter has been concerned with social policy studies, community service, and non-credit programs in public administration, management and labour leadership. To these has been added a new division for credit programs, charged with expanding evening credit offerings, developing new types of part-time programs, and investigating "distance education," the offering of off-campus classes. Continuing Education at Dalhousie also offers support to the university's professional schools in their programs of continuing professional education.

Part-time and adult students are invited to use the services offered by Continuing Education at Dalhousie. In September of each year, a "Returning to Learning" orientation is held, sponsored by Continuing Education and Counselling Services. The Mature Student Advisor and the Dean are available to offer program advice. Calendars and brochures are published describing summer school and evening credit classes, non-credit and general interest classes and the continuing education programs of the Institute of Public Affairs.

Continuing Education at Dalhousie is located in the Henson Centre, at University Avenue and Seymour Street, as well as 6100 University Avenue and several adjacent houses.

Officers

Dean of Continuing Education and Director, Institute of Public Affairs
Michael S. Cross, BA, MA, PhD (Tor.) Professor of History

Assistant Director, Institute of Public Affairs and Director, Advanced Management Centre
John H. Dougall, BA (Dal), MBA (Western Ontario)

Director of Policy Development
Douglas Myers, MA (Tor.), PhD (Edinburgh) Professor of Education

Mature Student Advisor
Lloyd Fraser, BA, BEd (Mt. Allison), MEd (Dal)

Director, Municipal Administration Program
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Research Coordinator, Regional and Urban Studies Centre
Stephen Macdonald, BA, MA (Dal)

Coordinator, Degree Programs
Stephen Frick, BA (Tor.), PhD (Cornell)

Academic Credit Programs

Part-time students are admitted to many of the credit programs. Admission requirements and regulations generally are the same for all students, although special provision is made for the admission of mature persons who lack normal entrance qualifications.

For information on admission and registration procedures, degree requirements, etc., see the entries for the programs of interest elsewhere in this calendar or in the calendar for the Faculty of Graduate Studies. Fee information is found on page 16. Note also the general university regulations on page 22.

Scholarships and Financial Aid

Certain awards and financial assistance are available for part-time students who qualify. Details may be found in the booklet *Scholarships, Prizes and Financial Aid*, available from the Awards Office.

Special Opportunities for Study and Development

A wide variety of non-credit courses is available in such areas as computers, self-instructional language programs, skill development in many areas, the arts, law, health, social issues, career development and career change.

Information may be found in a separate calendar for Continuing Education available from Continuing Education or the Registrar.

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Innis M. Christie, BA, LLB, LLM, from July 1, 1985.

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Medicine: J.D. Hatcher, MD, PhD, FRCP(C)

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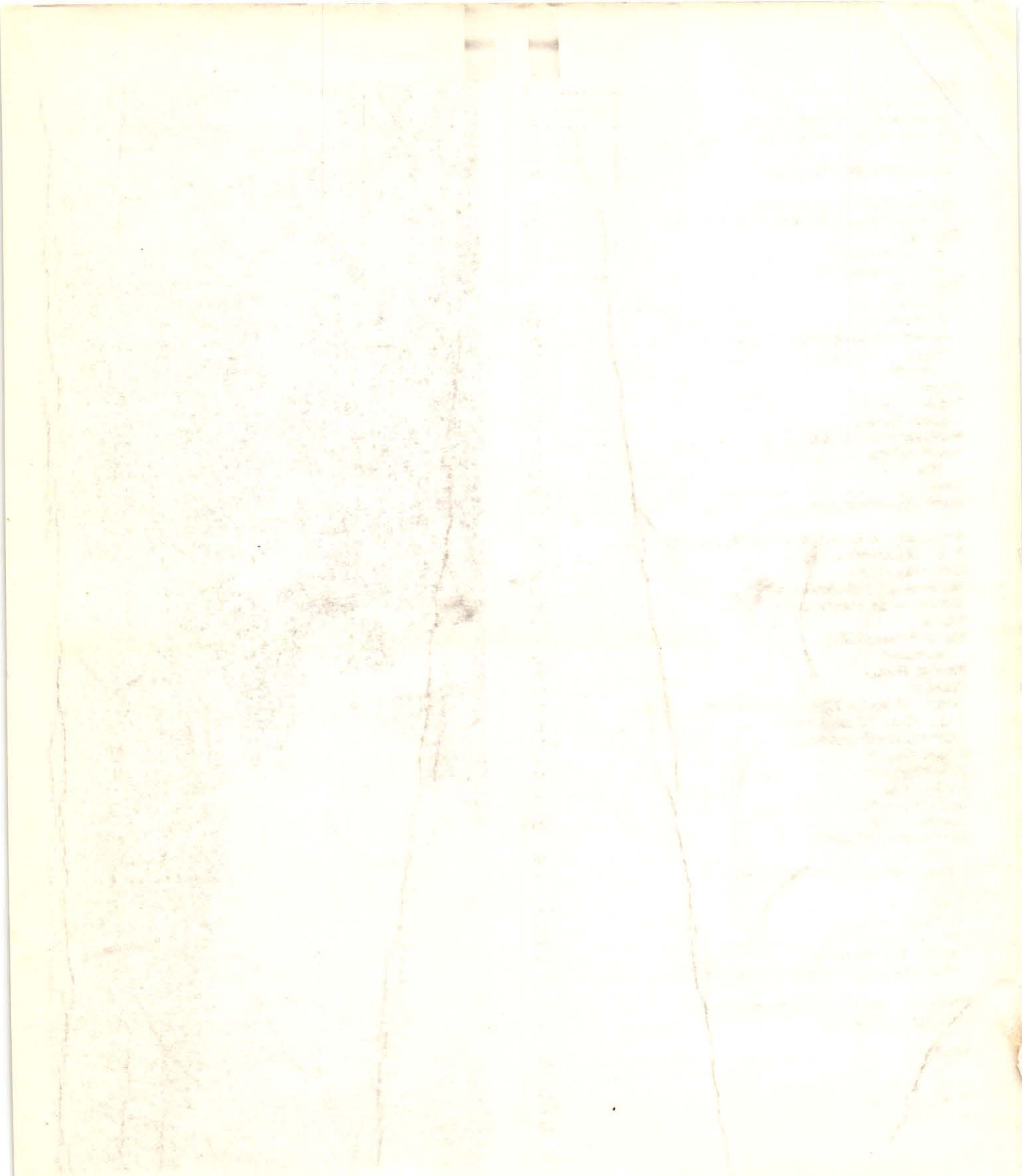
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Index

Absentia, degree in	18	Engineering	67
Academic Programs Listing	10	English	69
Administration, The	198	Evaluation Procedures	
Administrative Officers	198	Irregularities	15
Admissions		Exchange Programs	30
Application Dates	7	Experimental Classes	29
Fee Deposit	16	Faculties Listing	9
Irregularities	14	Fees	16
Requirements	22	Fee Refunds	18
to Classes	23	Fee Table	17
Advanced Placement	26	Foreign Student Fees	16
African Studies	31	French	73
Almanac	4	German	81
Alumni Association	13	Geology	77
Ancient History	32	Health Education	82
Anthropology	32	Health Education, School of Recreation, Physical and	170
Appeals	30	Health Professions, Faculty of	148
Application Fee	16	History	82
Architecture	32	of Dalhousie	9
Armed Forces	13	Humanistic Studies in Science	88
Arts and Science, Faculty of		ID Cards	23
Introduction and Regulations	21	Charges for	18
Assessment	27	Income Tax	
Athletics	12	Fees Deductible	18
Audit of Classes	26	Institutes & Centres Listing	9
Audit Fees	16	Descriptions	195
Awards Office	13	International Development Studies	88
Biochemistry	32	International Programs	30
Biology	34	Laboratory Charges	18
Board of Governors	198	Libraries	11
Business Administration, School of	185	Linguistics	90
Canadian Armed Forces	13	Management Studies, Faculty of	185
Canadian Studies Program	43	Marine Biology	90
Centres & Institutes Listing	9	Maritime School of Social Work	180
Certificate, Degree and Diploma Requirements	24	Mathematics, Statistics and Computing Science	91
Change from BA to BSc and Vice Versa	28	Mediaeval Studies	99
Chaplaincy	11	Merit Points	28
Chemistry	43	Meteorology	100
Classics	48	Microbiology	100
Clubs and Organizations	12	Music	102
Colleges & Schools Listing	9	Nursing, School of	149
Comparative Literature	51	Occupational Therapy	153
Computing Science	52	Oceanography	108
Continuing Education	197	Off-campus Classes	29
Coordinated Programs	29	Offenses, Academic	14
Correspondence Classes	29	Officers of the Faculty of Arts and Science	21
Cultural Activities	12	Organizations and Clubs	12
Dalhousie Student Union	12	Part-time Students	26
Definitions	15	Penalties	15
Degree, Certificate and Diploma Requirements	24	Pharmacy	159
Delinquent Accounts	16	Philosophy	109
Dentistry, Faculty of	145	Physical & Health Education, School of Recreation	170
Departments of the Faculty of Arts & Science	21	Physics	113
Duration of Undergraduate Studies	26	Physiotherapy	165
Education	59		
Economics	55		

Plagiarism	14
Political Science	118
Preparation for other Programs	26
Programs Offered, Faculty of Arts & Science	22
Psychology	124
Public Administration, School of	194
Readmission after Required Withdrawal	29
Recreation, Physical and Health Education, School of	170
Registration	23
Registration Fees	16
Withdrawal and change of	24
Regulations	
Changes in	30
Fee Payment	16
General Arts and Science	21
Senate	30
University	14
Religion	128
Repeating Classes	28
Required Standing	28
Residence Accommodation	12
Residence Charges	18
Table	19
Russian	129
Russian Studies Program	131
School of Recreation, Physical & Health Education	170
Schools & Colleges Listing	9
Senate Regulations	30
Social Work, The Maritime School of	180
Sociology & Social Anthropology	132
Spanish	137
Special Institutes Listing	9
Descriptions	195
Standing, Required	28
Statistics	91
Student Aid, Scholarships and Other Awards	23
Student Clubs & Organizations	12
Student Counselling Services	11
Student Housing	12
Student Services	11
Student Union	12
Subject Groupings	22
Summer School	29
Summer Session Students	
Fees	16
Supplemental and Special Examination Fees	18
Theatre	140
Transcripts	18
Transfer Credit	26
Transition Year Program	143
Two Undergraduate Degrees, Counting Classes for	26
University Computing and Information Services	11
University Health Service	11
Withdrawal	24
Required	28
Writing Classes	24
Women's Studies	144
Workload	28







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